

## Online (remote) education and Covid-19: teachers' experience in medical education mediated by active methodologies

*Educação (remota) on-line e Covid-19: experiência de professores na educação médica mediada por metodologias ativas*

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### ABSTRACT

**Introduction:** In 2020, aiming to contain the progression of the Coronavirus pandemic, social distancing was determined by reducing interactions between people. The educational institutions were closed and distance teaching-learning was applied using digital technologies for study continuity. The closing of a community university in Santa Catarina, in the medical course, implied in a disruptive situation regarding the teaching format, since they use active methodologies and these had not been applied digitally up to that moment. From these circumstances, one asks how the faculty perceives and experiences this new reality.

**Objective:** This study aimed to understand the experiences of educators teaching from the first to the fourth year of medical school using active methodologies during the remote education activities at the emergence of the Coronavirus pandemic aiming at understanding the impacts on learning.

**Method:** This is a field research with an exploratory objective and a quantitative-qualitative approach. This study has been analyzed by the Research Ethics Committee. The participants were contacted by electronics means and were invited to answer a two-step questionnaire using the Google Forms platform, containing objective and descriptive questions regarding their experience with remote teaching. Data analysis was performed by statistics, by thematic content analysis and by correlation analysis, and the findings were compared using the theoretical reference.

**Result:** Twenty-nine teachers answered the survey. Most of them felt, at least, partially prepared to work in the remote education and guidance and requests for help were not related to the preparation. Facilities and weaknesses related to the technology were observed. Computers, cell phones and Google Meet were the recourses most often used. Adaptations for the materials used in face-to-face classes were necessary, but in some cases, they were not satisfactory. The pedagogical activities were accomplished within the proposed ones, but two-thirds of the teachers believed there were losses related to study quality and half of them adjusted their behavior to virtual class mediation.

**Conclusion:** The transition to the digital teaching format constituted a challenge for the teachers. The learning process was compromised; however, benefits and potentials were observed. A change is occurring in society and digital teaching is being solidified and training is essential to support this process in active methodologies.

**Keywords:** Online education; Covid-19; Faculty; Medical education; Active learning.

### RESUMO

**Introdução:** Em 2020, a fim de conter a progressão da pandemia do coronavírus, determinou-se o distanciamento social por redução da interação entre as pessoas. As instituições de ensino foram fechadas, e adotou-se o ensino-aprendizagem a distância aplicado por tecnologias digitais para a continuidade do estudo. O fechamento de uma universidade comunitária em Santa Catarina, no curso de Medicina, implicou uma situação disruptiva quanto ao formato de ensino, visto que se utilizam metodologias ativas que não haviam sido aplicadas digitalmente até o momento. Dessa circunstância, pergunta-se como o corpo docente percebe e vivencia essa nova realidade.

**Objetivo:** Pretendeu-se conhecer a experiência de professores do primeiro ao quarto ano de graduação médica com metodologias ativas durante as atividades do ensino remoto no advento da pandemia do coronavírus para entender as repercussões na aprendizagem.

**Método:** Trata-se de uma pesquisa de campo, com objetivo exploratório e abordagem quanti-qualitativa. O trabalho passou por apreciação do Comitê de Ética em Pesquisa. Os participantes foram contatados eletronicamente para responder, na plataforma Google Forms, a um questionário dividido em duas etapas com perguntas objetivas e descritivas relativas à vivência deles no ensino remoto. A exploração de dados ocorreu por estatísticas, análise temática de conteúdo e análise de correlação, confrontando-se os resultados com o referencial teórico.

**Resultado:** Responderam à pesquisa 29 professores. A maioria deles se sentiu ao menos parcialmente preparada para atuar no ensino remoto, e orientações e busca por auxílio não se correlacionaram com o preparo. Facilidades e fragilidades relacionadas à tecnologia foram observadas. Computador, celular e Google Meet foram os recursos mais utilizados. Materiais do presencial necessitaram de adaptações, não sendo satisfatórias em alguns casos. As atividades pedagógicas foram cumpridas dentro do proposto, entretanto, para dois terços dos docentes, houve prejuízo na qualidade do ensino, e metade deles mudou de conduta para mediação de aulas virtuais.

**Conclusão:** A passagem para o ensino digital foi um desafio para professores. A aprendizagem foi comprometida, porém observaram-se benefícios e potencialidades. Como há um processo de mudança na sociedade com o propósito de consolidar a educação digital, são essenciais as devidas capacitações para apoiar esse processo em metodologias ativas.

**Palavras-chave:** Educação On-line; Covid-19; Professor; Educação Médica; Aprendizagem Ativa.

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## INTRODUCTION

A new coronavirus was discovered in December 2019, in China, which causes the Covid-19<sup>1</sup> respiratory syndrome. With a high level of contamination, this pathogen spread rapidly across the continents, affecting the health of the global population – 5% of the cases require intensive support, with a mortality rate that can reach 40%<sup>2-4</sup>. This led the World Health Organization to declare the situation a pandemic in March 2020<sup>5</sup>.

Thus, aiming to reduce the transmission of the virus and prevent the collapse of the health system, social distancing was determined, by suspending events, canceling trips and closing physical shops, companies and educational institutions, reducing the contact between people<sup>6</sup>.

In the state of Santa Catarina, face-to-face classes at all levels of education were suspended by Decree n. 525 in March 2020, with no prospects for normalization, until the gradual return of in-class activities was authorized in November<sup>7,8</sup>. However, during this period of uncertainty, aiming to mitigate the impact of Covid-19 on the pedagogical setting and ensure student learning, the Ministry of Education, through Ordinance N. 343/2020, authorized the use of virtual technologies for the implementation of remote/emergency teaching to replace face-to-face theoretical-cognitive classes, on an exceptional basis<sup>9,10</sup>.

Remote teaching is configured as a solution for study continuity amidst the pandemic and its objective is not to create an educational system but to carry out classes in a similar way to those that would be provided in a face-to-face setting using digital resources<sup>11</sup>. Distance Education (DE), regulated for all levels of education in Brazil in 1996, is a teaching modality that has a pre-established structure and methodologies for conducting the teaching-learning process through Digital Technologies of Information and Communication (DTIC) with teachers and students occupying different physical spaces<sup>12,13</sup>.

The closing of a community university in the state of Santa Catarina also resulted in this change from face-to-face to online teaching. This caused, in the medical course, a disruptive situation regarding the teaching format, since they use active methodologies in academic training and these had not been applied digitally up to that moment.

Active methodologies apply simulated or real problem-situations arising from professional practice during group discussions so that students seek explanations to respond to the conflict, leading them to the production of knowledge and individual and collective development<sup>14</sup>. The pedagogical activity aims to strengthen students' autonomy and make them part of their professional construction to establish solid learning and create critical awareness. The teacher does not transmit knowledge but monitors the students' development

and encourages the search for knowledge and self-sufficiency<sup>15</sup>.

Questions about the educational process arise from this circumstance. Gordon et al.<sup>16</sup> question whether educational institutions have the necessary resources and if they are prepared for this change to the virtual world. Gomes et al.<sup>17</sup>, on the other hand, question whether the emergency teaching will affect the training of future physicians regarding technical matters and personal relationships and whether this process will bring innovative responses to education. Thus, what are the faculty's perspectives on these issues?

With this study, we sought to investigate how teachers of medical courses that didactically use active methodologies perceive the experience of remote classes during the coronavirus pandemic. This study to broaden the conceptions about DE from the perspective of this educational format and understand its effects on the teaching-learning process.

## METHOD

This is a field research, as it collects information from individuals, with an exploratory objective, as it builds familiarity with the problem by creating hypotheses<sup>18</sup>. The approach is a quantitative-qualitative one, focusing on the qualitative. The measurable properties are attributed to the quantitative and the qualitative approach involves the meaning of the contents<sup>18,19</sup>.

The study was evaluated by the Research Ethics Committee in accordance with resolution n. 466/2012<sup>20</sup> of the National Health Council, having been accepted under CAAE 34217420.70000.5368. The confidentiality and privacy of all participants is ensured.

The participants were selected by easy access (non-probabilistic sample for accessibility)<sup>21</sup>. The research universe consisted of teachers who taught from the first to fourth year of medicine at the university under study, responsible for the tutoring scenarios and the Community Health Practice Unit (UPSC, *Unidade Prática de Saúde na Comunidade*), who gave remote theoretical classes during the restriction of face-to-face activities. Both scenarios comprises groups of 8 to 10 students and a teacher.

Tutoring involves theoretical learning applied by Problem-Based Learning. It is developed through the presentation of a problem prepared by the teacher-tutors and related to the necessary requirements for training; the students conduct brainstorming to analyze the problem and identify gaps in knowledge, defining learning objectives; after personal studies, the topics are discussed in class, resolving the conflict<sup>22,23</sup>.

The UPSC uses problematization didactics, with a practical part developed in the basic health units and with a theoretical class called 'cycle'. The process is based on the

following aspects: identification of a knowledge gap during the students' practical experience; establishment of a study focus to foster their ability to seek reflective solutions; creation of hypotheses based on the theoretical framework; and application of new knowledge to reality (action-reflection-action)<sup>23,24</sup>.

The teachers were contacted by e-mail and WhatsApp due to the limitation of social interaction. Information about the research proposal was provided together with a link that directed to the Free and Informed Consent Form to obtain their agreement to collaborate with the study<sup>20</sup> and the questionnaire. Data collection took place between November and December 2020.

The questionnaire is a two-stage, self-administered survey, created by the researchers using the Google Forms platform. The first stage comprised questions about the participants' age and sex, followed by nine objective questions with scaled items and the possibility of a choice related to: feeling of preparedness to work virtually, previous experience with DE, discussion with colleagues about the situation, request for help, receiving guidance on online classes, perception of the positive side of change, improvement in being a teacher, difficulty adapting to the routine and exhaustion during this period.

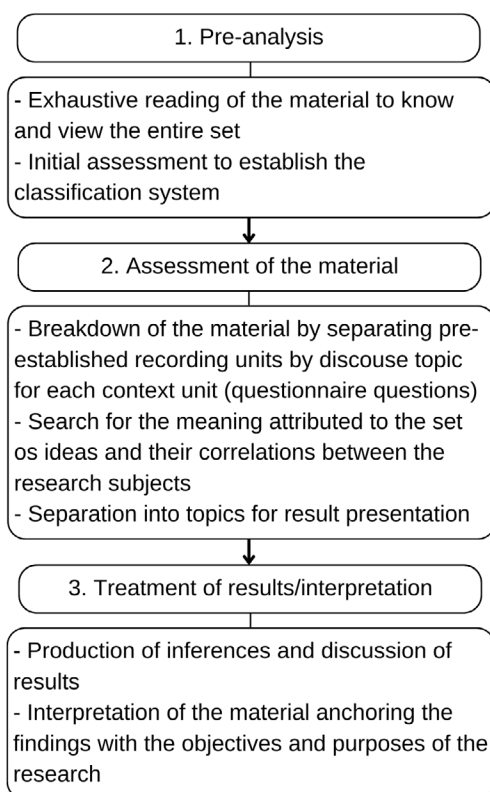
The second part had nine questions with descriptive answers for the subjective evaluation of the participants' opinion about: strengths/weaknesses of virtual education,

possible learning from this experience, digital tools and technological resources used, lack of resources in the classroom, completion of activities, quality of teaching, teacher's mediation in classes and significant experiences. A space for comments was included at the end.

The analysis of the objective data was a descriptive one – the statistics automatically constructed through the Google Forms led to processing through mathematical calculation, presentation in tables and interpretation by exploring the data<sup>18,25</sup>. For the qualitative assessment, thematic content analysis was applied, in which inferences are made about relevant topics in the discourse and the frequency at which they appear<sup>19</sup> is calculated, as shown in the flowchart in Figure 1. The correlation analysis, which verifies the intensity of the association between the variables<sup>26</sup>, was carried out manually by the researchers through simple calculation of a linear relationship based on a table created in Excel, showing the most significant ones.

Finally, the literature search was expanded through a non-systematic search in databases, with the choice of material being made at the discretion of the researchers. The obtained results can be compared with the theoretical framework on education during the coronavirus pandemic to answer the raised assumptions, produce knowledge and give meaning to the data<sup>27</sup>.

**Figure 1.** Thematic content analysis flowchart



Source: Prepared by the authors based on Minayo et al.<sup>19</sup>.

## RESULTS

In 2020, the university had 42 teachers, of which 29 participated in the research (69%). Of those interviewed, 15 were tutoring teachers (52%), 12 were UPSC teachers (41%), and 2 were teachers from both educational units (7%). Sixteen female (55%) and 13 male (45%) teachers participated in the study. As for the age group, there were 2 teachers under 30 years old (7%), 11 between 31 and 40 years old (38%), 7 between 41 and 50 years old (24%), 4 between 51 and 60 years old (14%), and 5 over 60 years old (17%).

The quantitative questions are related to the teachers' preparedness to work in remote teaching. According to the categorization of the qualitative questions, three topics were separated: strengths, weaknesses and learning observed in online classes; applicability of digital technologies in remote teaching; and effects of remote teaching on teacher learning and performance in active methodologies. The participants' discourses are represented by numbers in parentheses.

### Teachers' preparedness to work in remote teaching

The absolute and relative values of the quantitative questions are shown in Table 1.

There was no difference between men and women and between the age groups regarding the degree of preparedness for emergency virtual classes.

All teachers who did not feel prepared to work in remote teaching had no previous experience with DE; however, half felt at least partially prepared because they had previous contact with online classes.

The degree of guidance received from the institution did not correlate with the degree of feeling prepared for emergency education. There was no positive association between teachers who had discussions with other colleagues and/or asked for help with the feeling of being prepared for virtual classes; however, teachers who did not seek help did not feel prepared to work online.

### Strengths, weaknesses and learning observed in online classes

The strengths observed by the teachers were: 1. easy access and absence of displacement; and 2. schedule flexibility. The organizational aspects were a plus point for convenience.

*"There is no displacement" (T12).*

**Table 1.** Teachers' preparedness to work in remote teaching

Question	Answer (N e %)
Do you feel prepared for DE?	No: 5 (17.2%) Partially: 19 (65.6%) Totally: 5 (17.2%)
Did you have any previous experience with DE?	As a teacher, only: 1 (3.4%) As a student, only: 8 (27.6%) As a teacher and a student 2 (6.9%) Never: 18 (62.1%)
Do you have discussions with other teachers of the medical course about the best ways to proceed at this moment?	Never: 1 (3.5%) Sometimes: 15 (51.7%) Always: 13 (44.8%)
Do you ask for help from someone more experienced in the use of technologies and/or DE, when you are having difficulties?	Never: 3 (10.3%) Sometimes: 12 (41.4%) Always: 14 (48.3%)
Did you receive any guidance on how to proceed with virtual classes and/or instructions on how to use the technological resources available for this purpose from the institution?	None: 4 (13.8%) Insufficient: 11 (37.9%) Sufficient: 14 (48.3%)
Do you perceive any positive side related to the change from face-to-face to online classes?	No: 6 (20.7%) Partially: 21 (72.5%) Totally: 1 (3.4%) I don't have an opinion: 1 (3.4%)
Has this experience made you a better teacher than before?	No: 7 (24.1%) Partially: 8 (27.6%) Totally: 14 (48.3%)
Did you find it difficult in adapting your work routine and family dynamics to the change of location of classes to your home?	No: 11 (37.9%) Partially: 12 (41.4%) Totally: 6 (20.7%)
Are you feeling more exhausted after the online tutoring/cycle than in the face-to-face process?	No: 14 (48.3%) Partially: 9 (31.0%) Totally: 6 (20.7%)

Source: Prepared by the authors.

*"Comfort at home, coffee, water, temperature control" (T14).*

*"More flexible hours" (T6).*

Likewise, protection against Covid-19, which changed the dynamics of teaching, was a strength.

*"Biological safety purpose" (T26).*

The weaknesses perceived by the teachers are related to: 1. decreased social interaction, human interaction and lack of practical experience; 2. inequitable internet access and technical problems; and 3. difficulty interpreting the students.

For the teachers, remote teaching was harmful to coexistence, because technology does not establish contact in the same way. Also, for the UPSC teachers, the lack of the practical part of the scenario was adverse to the progress of the classes by taking students away from reality and breaking with the action-reflection-action course of problematization.

*"There is no adequate Medicine without coexistence" (T5).*

*"There was a deficit in social interaction in teamwork" (T20).*

*"You lose human contact" (T28).*

*"The construction of the meaningful learning process arises from the student's experience in practice in the community. If this experience is not established, meaningful learning is undermined, since it is not possible to capture the essence of the experienced reality from a fictitious/simulated practice" (T2).*

The second weakness mentioned was the difference in the quality of internet connection and technological resources, which made interaction difficult and created inequalities for the progress of classes.

*"Dependence on digital media and its flaws" (T26).*

*"We don't have equipment and access capacity that allow participation on equal terms" (T19).*

There were still adversities in understanding the students' expressions due to the screen limitation to dialogue.

*"Need for greater attention to analyze body postures" (T13).*

*"The interpretation of behaviors and response is different in the remote" (T20).*

The lessons learned by the teachers were: 1. skills in technology and communication and their applications in teaching; 2. capacity for reinvention and adaptation; and 3.

possibility of study continuation.

The teachers needed to become familiar with the technologies and their teaching possibilities to better carry out remote classes.

*"I acquired the ability to use electronic means of communication" (T4).*

*"New ways to promote learning, greater learning and updating in digital media" (T26).*

With this exceptional moment, the participants understood that human beings are capable of adapting to adverse situations and that education has been transformed, allowing the continuation of their studies.

*"Daily adaptability" (T5).*

*"Resilience" (T23).*

*"There is the possibility of learning" (T10).*

*"Online classes can be very productive" (T15).*

### Applicability of digital technologies in remote teaching

The technological tools predominantly used by the teachers were the computer and the cell phone, and secondarily, the tablet. Google Meet was the communication service used by most teachers (96%) at some point in their emergency pedagogical practice. Other less used services were Zoom, Hangouts, Classroom, Google Forms and WhatsApp.

As Google Meet was more often used, educators highlighted it as the easiest resource to carry out the remote classes.

*"It provided an environment very close to face-to-face tutoring" (T8).*

*"It is practical, safe and we have functions and updates that further help in this online work" (T18).*

For a third (33%) of the participants, it was not possible to replace the following pedagogical resources used in the classroom by digital means: 1. board for brainstorming, schematics and drawings; and 2. synthetic anatomical parts. They consider these physical tools as essential for a complete and good-quality class.

*"Screen sharing cannot do the same job" (T16).*

*"When I tried adaptations, I found it unsatisfactory" (T27).*

On the other hand, for the other two thirds (66%) these pedagogical resources were satisfactorily adapted through: 1. screen sharing for images, videos, slides and notes; 2. chat

to brainstorming, sending articles and comments; and 3. 3D program. Classes can be held with the possibility of learning with the implementation of digital resources.

*"Tools available on Google Meet were used to meet this requirement" (T11).*

*"We adapted using the available resources and I am satisfied with the result" (T18).*

Almost all teachers who felt the lack of resources during classes had no previous experience with DE. Among the teachers who satisfactorily replaced the resources, half had had a previous contact with DE. All teachers who did not request any kind of help felt a lack of resources, while most teachers who requested some help did not feel the lack.

The 'cycle' teachers felt more the lack of resources, when compared to 'tutoring' teachers. The main deficiency for the 'cycle' teachers was the board and for the 'tutoring' teachers the deficiency was the same for the board, synthetic parts and slides. The 'cycle' teachers who managed to substitute the resources used both screen sharing and chat, while the 'tutoring' teachers used mainly screen sharing for this purpose.

### Consequences of remote teaching on learning and teacher performance in active methodologies

Among the teachers, 93% believe that academic activities were carried out within the scope proposed during the pandemic, although the virtual environment was not the best way to carry out the classes.

Approximately one-third (33%) of the teachers did not perceive any differences in educational quality, since: 1. learning issues were met; and 2. the class level was similar, with prior preparation of the students. For them, the transition to online teaching did not impact student performance and commitment to the studies, maintaining the class level.

*"I did not notice any difficulties" (T11).*

*"All subjects are discussed in the 'cycle'" (T22).*

The other two thirds (66%) observed differences in the quality of teaching regarding the following aspects: 1. less mastery of the content; 2. lack of commitment; and 3. decreased dexterity and participation. For these teachers, the activities carried out virtually had a negative impact on the educational format and/or on the students' behavior, affecting the teaching-learning process.

*"I observe there was some damage to learning and the mastering of contents" (T13).*

*"There was a great lack of interest from the students" (T27).*

*"The performance and dexterity of some colleagues were less effective in the virtual environment, sometimes with difficulty expressing themselves" (T23).*

Half (50%) of the teachers did not change their behavior for the mediation of remote classes due to: 1. maintaining the face-to-face pattern; 2. continuity of the conduction of discussions; and 3. all occurred spontaneously. These teachers did not change the mediation pattern during classes to continue to exercise their role as teachers in courses using active methodologies, accompanying and stimulating the search for knowledge and giving meaning to learning.

*"I kept the same conduct I always had in tutoring" (T8).*

*"I manage to report professional practice in context with the theoretical part" (T9).*

*"I question and induce reasoning and curiosity" (T15).*

The other half (50%) changed their conduct to mediate classes due to the need to: 1. intervene and demand more during discussions; 2. give more attention to the process; and 3. further motivate the students. There was a reconfiguration of the dynamics in the remote activities for some teachers, who demanded the implementation of actions to guarantee the class flow continuity and to evaluate the students.

*"I had to interfere more often to stimulate discussions" (T24).*

*"Need to observe whether the students were confident in their statements or if they were reproducing material they had read" (T7).*

*"More energy spent in order to motivate students" (T13).*

The perspectives on the importance of interpersonal relationships to settle impasses were brought up in the reports.

*"The seriousness of the group caught my attention" (T22).*

*"I believe that good communication, sharing responsibilities was the best tool [...]" (T29).*

Regarding the change in the quality of classes, the 'cycle' teachers found less dexterity and participation; while the 'tutoring' teachers, on the other hand, observed a decrease in content mastery and interest.

The proportion of teachers who changed their behavior to mediate the classes was the same between the 'cycle' and 'tutoring' teachers. Most teachers who changed their behavior noticed differences in the quality of teaching. One-third of the

teachers who did not change their behavior did not notice any differences in educational quality; however, the other two-thirds who did not change their behavior noticed differences in quality.

Finally, few teachers filled out the comments section. It was pointed out that the survey questionnaire contained many broad and qualitative questions, making filling it out a tiring activity.

## DISCUSSION

The interruption of face-to-face classes led to the immediate implementation of emergency teaching, generating an educational paradigm. One of the main challenges is related to the teachers' performance, as they were required to master the virtual educational practice within a very short period of time, even though effective training in a short period is impossible and with preparation stages being overlooked<sup>11,28,29</sup>. In this study, only one fifth of the teachers felt fully prepared for remote classes during the pandemic and less than half had had some previous contact with DE, mainly as a student. As revealed by Rodrigues<sup>30</sup>, teacher training is very much related to content and does not include digital literacy and skills aiming at other ways of constructing teaching and its tools.

Additionally, many of the teachers who had previously used technologies for classes had technical support, and at that moment, this support from the institutions was essential<sup>11,16</sup>. Maciel et al.<sup>31</sup> show in an experience report about classes using active methodologies during the pandemic that communication between teachers to solve problems and dialogue with the course coordination are crucial for successful learning. The teachers in this study realized the importance of support to overcome the difficulties of the virtual environment. Half of them mentioned the institution's failure to provide assistance with the use of technologies.

The contact of educators with digital teaching promotes their insertion in this educational model, which, even with the adversities that occurred during the pandemic, allows teaching practice improvement<sup>32</sup>. Three-quarters of the teachers reported that remote classes have a positive side and contribute to their professional performance. This circumstance makes one think about ways of producing knowledge from the appropriation of DTIC and new future possibilities to tread new paths in teaching<sup>33,34</sup>.

Changing the location of classes to the home environment required teachers to reconcile their work routine with domestic activities and family life. About two-thirds of the participants in this study had some difficulty in transitioning from the classroom to the home environment. One impasse may have been the adequacy of sharing equipment such as

computers with other family members, who equally needed to work from home or study at home<sup>35-37</sup>.

Moreover, in this study, half of the teachers claimed to be more tired after remote classes compared to face-to-face ones. Psychosomatic symptoms due to exhaustion can occur due to high demand from private institutions and lack of motivation<sup>37,38</sup>. For educators working on the front lines against the coronavirus pandemic, there is also the stress related to the risk of being infected or infecting others, exposure to death on a large scale, distancing from family and friends and increased work hours<sup>39</sup>.

The article by Figueiredo et al.<sup>40</sup> points out that the transition to emergency online classes in medical courses reduces commuting and increases free time; however, distancing restricts the interaction between students during classes, extension projects, research groups and internships. In line with this position, in this study, teachers claimed the advantage of the virtual in relation to time and space, making it possible to share the same environment through technology use<sup>41</sup>. They also evaluated that the physical presence is irreplaceable and the lack of contact is harmful, since humans need to live in a community<sup>42</sup>.

The distancing made it impossible for students to start medical practice, keeping them away from their study objective – the patients and their realities<sup>43,44</sup>. The contact with the reality aims to train professionals who are empathetic and committed to the biopsychosocial aspects to be prepared to work in the Unified Health System, and communication skills come from interacting with the population and with teachers and classmates<sup>17,23,45</sup>.

Thomas et al.<sup>46</sup> questioned medical faculty teachers in India and found that 62.9% of them do not like remote classes due to internet connection problems. The contrast between the technology available to students and teachers can create a difference in participation and an unequal learning condition<sup>16,47</sup>. However, according to Severo Bem Junior et al.<sup>44</sup>, in Brazil, in private higher education and in medical schools, there are fewer students with difficulties to access the digital environment. These data are similar to those in the present study, in which technical problems were observed, but reports of inequality were less frequent.

Another adversity of emergency teaching was screen interaction, because to contribute to learning, teachers must observe both content mediation and emotions<sup>48</sup>. During video calls, people only appear from the shoulder up and the brain lacks body language, such as looks and movements and more concentration is required when viewing several people at the same time<sup>49,50</sup>. Additionally, for these reasons and the possibility of hiding the material, it was complex for the teachers to discern

when the student had studied previously or read/researched during class.

The Covid-19 crisis led to a large-scale mandatory use of virtual means to mediate classes, requiring new skills and instigating digital literacy at an individual and social level<sup>51</sup>. Computer use had already been boosting distance learning through DTIC; however, the re-elaboration of this process amidst the pandemic is being consolidated, with the expression 'new normal' emerging to characterize this evolution<sup>52-54</sup>. In this sense, the teachers believe the educational advancement was due to the need to adapt for the continuity of studies and boosted the acquisition of technological skills for teaching. According to Paulo Freire<sup>55</sup>, change is possible, although difficult, and it is necessary to verify the reality to recreate it, intervening, transforming and creating knowledges.

The Brazilian Institute of Geography and Statistics<sup>56</sup>, in 2019, found that of the Brazilian households, 40.6% have a computer, 11.3% have a tablet, and 81% of the population over 10 years old have a personal cell phone. In another perspective, the Getulio Vargas Foundation<sup>57</sup>, in 2021, found that there are 2.1 digital devices per inhabitant in the country (40% notebooks, 42% desktops and 18% tablets), for corporate and domestic use. Consistent with these data, teachers mainly used computers and cell phones and, secondarily, tablets to carry out remote classes. Although they do not specify, it is believed that the devices come from a domestic or workplace resource.

The greater use of Google Meet by teachers may be a reflection of the fact that, previously, the university had already integrated G-SUITE, Google's collaboration program for the business and educational sectors. They evaluated this platform as adequate and easy to use with several available tools. After the advent of the pandemic, Google Meet launched resources to facilitate and expand its use and these devices help with collaboration and integration in classes<sup>12,58</sup>.

In a study, Santos<sup>29</sup> reported that Portuguese teachers working in remote teaching during the pandemic found it impossible to efficiently replace face-to-face classes with virtual ones, as intrinsic elements of education are lost in this transition. This perception was observed by some teachers in the present study, when they felt there was a lack of resources during classes. However, this maladjustment may result from incomplete mastery of technologies by the teachers, lack of prior training for digital education and resistance to the online environment<sup>29,41</sup>.

Nevertheless, the experience of Kawakami et al.<sup>59</sup> with the presentation of slides, summaries, mind maps and images during theoretical discussions in class in a medical course mediated by active methodologies during the pandemic was positive for the construction of knowledge, similar to the description given by some teachers in the present study. This shows that it is possible

to adapt to technology and that learning is based on the possibility of creating and changing attitudes<sup>31,53,60</sup>.

The teachers recognized that virtual classes were a solution to the interruption of classes, despite difficulties and/or criticism. According to Hodges et al.<sup>11</sup>, remote teaching differs from DE, as it consists of an emergency measure for the continuity of education. DE was hurriedly established with minimal resources, which made it impossible to take advantage of the capabilities of this teaching modality. Thus, it is necessary to evaluate its implementation and development in technological and pedagogical aspects to avoid the impact on training<sup>61,62</sup>.

In a study carried out by Campos Filho et al.<sup>63</sup>, medical students stated that the study yields less when carried out online due to adaptation and organization. Estrada-Araoz et al.<sup>64</sup> found that university students are not attracted to remote virtual activities and feel uncomfortable with the barriers to dialogue. The virtual dynamic is different, with an excess of tasks, which can discourage students and overload their autonomy and self-determination in getting involved in the construction of knowledge and belonging to their professional training<sup>15,22,65</sup>.

These issues converge with the opinion of two-thirds of the teachers in this research, who found the study to be more inconsistent and perceived less commitment and participation from students, leading to the need to interfere more in classes and motivate them during the pandemic period. Teachers, by demanding more, are essential to keep students articulated, with better performance and assimilation of knowledge<sup>37,41</sup>.

Moreover, the interaction between teachers and students changed in this educational moment. Therefore, empathy – perceiving the needs of others – is an essential ability to maintain interpersonal relationships and overcome impasses, creating an environment of solidarity and trust for effective and dialogic learning<sup>66,67</sup>.

Half of the teachers were able to continue their role in active methodology education during emergency teaching. Teachers are facilitators of learning, and must challenge and promote conditions for construction, reflection and transformation, by being collaborative and giving meaning to knowledge<sup>14,15</sup>. They believe in the student's capacity in an environment of freedom and support, guiding them in their decision-making and setting the priorities<sup>24</sup>. The teacher's dedication, in a report by Kawakami et al.<sup>59</sup>, was essential to maintain learning mediated by active methodologies during remote classes.

Half of the teachers found the quality of remote teaching similar, as students were prepared and completed the activities. Technology is expanding the ways of teaching-learning construction and trailing new paths for post-



pandemic education<sup>12,68,69</sup>. This leads to the reflection of philosopher Pierre Levy<sup>70</sup> on modernity: "Update is the creation, invention of a form from a dynamic configuration of forces and purposes" (p.16).

## CONCLUSION

The rapid transition from face-to-face classes to digital teaching constituted a challenge for teachers working in active methodologies. This study found that teachers displayed distrust in emergency education and observed adversities that compromised the teaching-learning process in terms of its means and ends. However, they realized the need to implement remote teaching for study continuity and recognized the benefits and potential for developing skills and overcoming obstacles. It was observed that the student's commitment influences the quality of teaching and that the change in behavior of students and teachers modified the interaction between them.

The results of the study are important to understand the teachers' experience in emergency education at a medical school mediated by active methodologies and their consequences. By providing subsidies for discussions on this topic, it contributes to the consolidation of the positive aspects and helps to overcome failures.

As a limitation of this study, the regionalization of the sample and its specific context are highlighted, which may differ from the situation in other universities. Moreover, the questionnaire was extensive and many results were obtained to be interpreted, restricting its exploration and discussion. One can observe gaps in the production of new research related to medical education mediated by digital technologies to expand knowledge, and it is also necessary to obtain the students' view on remote classes.

Disruptive situations such as the Covid-19 pandemic force transformation, reconfiguring society. Changes are being consolidated in education with technological innovations, establishing the digital media as an ally in the construction of knowledge. More training and investments are essential to better support distance learning activities and consolidate active methodologies and their foundations in this process.

## AUTHORS' CONTRIBUTION

Manuella Martins Dallabrida participated in all stages of the pre-project, data collection and analysis/interpretation, and writing of the manuscript. Tania Maria Sbeghen de Oliveira and Marina Patrício de Arruda participated as advisors, providing help and support in all stages, in addition to correcting and critically revising the manuscript.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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