

# Assessment of the Academic Satisfaction of Graduate Students During the SARS-CoV-2 Pandemic, In An Internal Medicine Department.

Rodrigo Castro-Paris (✉ [rodrigo.castro@javeriana.edu.co](mailto:rodrigo.castro@javeriana.edu.co))

Hospital Universitario San Ignacio <https://orcid.org/0000-0002-4058-312X>

Oscar Mauricio Munoz-Velandia

Hospital Universitario San Ignacio

Angel Alberto Garcia-Pena

Hospital Universitario San Ignacio

Daniel Gerardo Fernández-Ávila

Hospital Universitario San Ignacio

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## Research article

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# Abstract

## Background

During the SARS-CoV-2/ COVID-19 pandemic, academic activities have been adjusted to include virtual components. The impact on student satisfaction with their medical education, especially in graduate programs, is unknown.

## Methods

The Internal Medicine Department of the Pontificia Universidad Javeriana and the Hospital Universitario San Ignacio, in Bogotá (Colombia), converted multiple theoretical academic activities to virtual modality, and modified the practical activities using technological platforms that allow remote participation of residents or teachers. A survey was designed to evaluate the satisfaction of residents in relation to the theoretical and practical components, and the perception of change.

## Results

48 residents responded the survey. > 72 % reported being partially or totally satisfied with the organization, content of the activities, interdisciplinary approach and opportunity to discuss topics for the theoretical activities. When evaluating the care activities, 21.9 % of the residents reported not being satisfied with the preparation that those activities give for clinical practice and professional life, and 31.3 % with the interdisciplinary approach, and time to discuss the cases. > 72.9 % were satisfied with the technological tools used. The level of perceived stress worsened for 62.5 %, and the opportunity to develop and practice skills worsened for 64.6 % of those surveyed.

## Conclusions

Despite the high satisfaction with the theoretical activities and the technological tools used, residents consider that the implementation of remote academic activities is associated with higher levels of stress and fewer opportunities to develop and practice clinical skills. New strategies are needed to improve practical components while maintaining social distancing.

## Background

The SARS-CoV-2/COVID-19 pandemic has spread rapidly around the world. During the last week of August 2020, more than 23 million of confirmed cases and 810,000 deaths were reported (1). One of the groups with the highest risk of SARS-CoV-2 contagion are healthcare workers, including training staff, which entails immense challenges to ensure the and learning process (2–4), in particular, when seeking to maintain social distancing measures, one of the most effective interventions to prevent disease transmission (5, 6).

Advances in telecommunications have proven their value and usefulness during disasters and public emergencies (7). In the SARS-CoV-2/COVID-19 pandemic, the use of digital tools has been essential to maintain fast and efficient knowledge exchange, and to achieve the modification of patterns of social relationship, consumption and education(8–14). Its use in medical education requires rapid adaptation and transformation of educational strategies within the medicine schools (4, 15–17).

The published information about the difficulties and potential solutions implemented by medical training programs during the pandemic is limited. Some orthopedic, anesthesiology, dermatology and ophthalmology programs have published descriptive studies and editorials sharing their experience(17–20). However, the magnitude of the impact of the SARS-CoV-2/COVID-19 pandemic on student satisfaction with medical education, especially in graduate programs, is unknown.

The Internal Medicine Department of the Pontificia Universidad Javeriana and the Hospital Universitario San Ignacio, designed and implemented adjustments to academic activities to include virtual components during the pandemic, aimed to students of first and second specialty programs of the Department. This study assesses the academic satisfaction of residents with the learning environment generated by such changes during the first months of the SARS-CoV-2/COVID-19 pandemic.

## Methods

Due to, the SARS-CoV-2/COVID-19 pandemic, from April 2020 the Department of Internal Medicine of the Pontificia Universidad Javeriana and the Hospital Universitario San Ignacio, converted to virtual mode multiple theoretical academic activities: conferences (classes), research meetings, and multidisciplinary discussions of clinical cases of academic interest. These activities were performed using the educational platform (Blackboard Collaborate®), which allows presentation of information and active participation of students and teachers remotely. The practical academic activities, ceased to perform at the patient's bedside, which was replaced by the patient's face-to-face assessment by one of the team members, and the academic discussion of the findings in a virtual meeting using Microsoft Teams®.

To evaluate student satisfaction with the learning environment, and the perception of change, a survey based on multiple questionnaires previously used for the assessment of academic satisfaction (17, 21–34) was designed. The survey was reviewed and tailored in a focus group including professors, students and methodological experts. The resulting tool was applied in a pilot to a group of seven newly graduated internists, to assess its comprehensibility and easy response. Their comments were taken into account for final adjustments.

Four domains were evaluated: availability and organization of teaching resources; theoretical and practical knowledge learning environment; working environment; and perception of change of academic activities, comparing the face-to-face mode, in the period immediately before the beginning of the pandemic vs the remote mode related to the social distancing regulations. Response options were designed using a Likert-like scale of four options for satisfaction, or five options for change perception assessment.

We invited all the first specialty residents (Internal Medicine, Dermatology or Geriatrics), and second specialty fellows (Gastroenterology, Cardiology, Pneumology, Endocrinology or Nephrology) to answer the survey. Residents with less than four months since admission to their academic program, and those who were not present in the HUSI during the February to May 2020 period, were excluded. The invitation was sent by institutional email, and the survey was applied through the Google and Forms® application, which ensures that the answers are anonymous, and that each student can only answer them once.

The demographic characteristics of the participants are presented as absolute numbers and proportions, or as central trend measures and dispersion measures, depending on the type of variable and according to whether the normal distribution assumption was met. A Shappiro Wilk test was used to evaluate this assumption. The comparison between subgroups was performed using an  $X^2$  test. The analysis was performed using Stata 15 software (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC).

## Results

90 residents were invited to participate, 48 (53.3%) answered the survey. The median age was 27 years (Interquartile range 26–29), most were women (66.7%) and the academic program with the highest participation was internal medicine (56.3%). A greater number of participants were in the first year of residence (39.6%). The characteristics of the participants are presented in Table 1.

Table 1  
Demographic characteristics n = 48

Feature	
Age-m(IQR)	27(26–29)
Female Sex-n(%)	32(66.7)
Academic Program-n(%)	
Internal Medicine	27(56.3)
Geriatrics	10(20.8)
Dermatology	5(10.4)
Cardiology	1 (2.1)
Gastroenterology	1(2.1)
Nephrology	2(4.2)
Endocrinology	1(2.1)
Current academic year-n(%)	
1st year resident	19(39.6)
2nd year resident	13(27.1)
3rd year resident	10(20.8)
4th year resident	1(2.1)
1st year fellow	4(8.3)
2nd year fellow	1(2.1)
<i>m(Median). IQR(Interquartile range).</i>	

## Academic satisfaction

Most participants (> 72%) reported to be partially or completely satisfied with the theoretical activities carried out virtually during the SARS-CoV-2/COVID-19 pandemic, in regard to their organization, content of activities, interdisciplinary approach and opportunity to discuss, teaching supervision and accessibility to teachers. Figure 1a.

First-year residents were more satisfied with the interdisciplinary approach, opportunity and time to discuss in remote activities than senior residents (100% vs 70.4%;  $p = 0.009$ ), (supplementary table 1). No other statistically significant differences were found when comparing subgroups based on sex, program or seniority in residence.

When evaluating practical activities (medical rounds in which at least one member had remote activity), 21.9% of residents reported not been satisfied with the preparation it gives for clinical practice and professional life, and 31.3% with the interdisciplinary approach, opportunity and time to discuss cases (Fig. 1b). Satisfaction with the latter topic was greater among men (91.7% vs 57.9%,  $p = 0.044$ ). (Supplementary *Table 2*).

Respect to the technological tools used, participants mostly (> 72.9%) expressed partial or total satisfaction, with "the training to use the virtual platforms for the development of educational or assistance sessions", "the ease of use of virtual platforms" and "the quality and fluidity of communication provided by platforms and connectivity services that are available to attendees". Satisfaction with "the availability and effectiveness of support groups for the development of educational or attendance sessions" was 60.4% (Fig. 2). The subgroup analysis found that residents of Internal Medicine were more satisfied with training for the use of virtual platforms than residents and fellows of other specialties (88.9% vs 61.9%,  $p = 0.027$ ). (Supplementary *table 3*).

In regard to the interaction with other health professionals, the participants considered that during the academic activities carried out after the start of the pandemic, their interaction with the team was optimal, they felt part of the team and considered that an attitude of professionalism and respect was promoted, between teachers and residents (proportion of according > 81.3%). (Fig. 3).

## Perception of change

The largest number of participants considered that classes and seminars improved by implementing remote measures in the pandemic period (50.0% and 53.6% respectively). Conversely, only a small proportion of participants considered that cases discussions and medical rounds had improved (29.2% and 25% respectively). According to the opinion of the majority of participants, the research meetings quality did not change (45%). (Fig. 4). No other differences were found when comparing subgroups based on gender, program or seniority in residence.

Overall, 39.6% of participants considered that the quality of their medical education degraded, and most considered that workloads were higher in the pandemic period (62.5% and 50% respectively). Similarly, the availability of time for extracurricular activities, perceived stress level and enjoyment of daily activities deteriorated partially or significantly by 50.0%, 62.5% and 43.8% of respondents respectively. The availability of time for self-study worsened for 43.8%, however, it improved for a similar percentage of individuals. Finally, the opportunity to develop and practice skills deteriorated for 64.6% of respondents (Fig. 5). (Supplementary *table 4*).

## Discussion

This study describes the impact on academic satisfaction related to the implementation of remote academic activities as part of postgraduate medical education by measures of social distancing because of the SARS-CoV-2/COVID-19 pandemic. We found that the participants were mostly satisfied with the

logistical organization, content, accompaniment in activities, technological tools used, and the interaction with other healthcare professionals. Despite this, they consider that the quality of their medical education deteriorated, and the opportunity to develop and practice skills was reduced, with an increase in perceived stress level and a decrease in the enjoyment of their daily activities.

This is not the first pandemic that has forced the reorganization of hospital care and the adjustment of academic activities. New ways of "normality" have been described in emergency situations in health institutions, in different moments and places (35), as described Miller et al (36) during the Spanish Flu in 1918 (37), the epidemic of polio in 1952 (38), and SARS-CoV epidemic in 2003. These changes have had consequences for classic methods of medical teaching, including changes in practical components (39, 41, 42).

In our study, we found high levels of satisfaction with the remote conferences (classes) and seminars, which, by their mainly theoretical nature, do not necessarily require a hospital environment for its development. Similar strategies, based on remote theoretical conferences, have already been previously implemented both in relation to the SARS-CoV-2/COVID-19 pandemic, and in other situations, connecting academic groups in distant regions (9, 10, 13–15, 17, 40, 43), with good results.

Our findings demonstrate low satisfaction with the medical rounds, suggesting that for the practical components, the accompaniment of a face-to-face teacher is essential. Braniff reported that the face-to-face practices (41) improved undergraduate student's perception of their preparedness in five areas: clinical and practical skills, communications skills, teaching and learning, understanding the work environment and team working. The present study reinforces the importance of face-to-face accompaniment for graduate students.

The participants in this study reported high levels of satisfaction, with respect to technological tools and platforms available for virtual activities, being higher among residents of Internal Medicine compared to residents of other specialties. We consider that this difference is related to the creation of a group of residents of internal medicine, who voluntarily and autonomously, promoted practice sessions with the platforms for their peers of the same program. Similar strategies can be used to optimize the acceptance of virtual platforms in other environments.

Despite satisfaction with the technological tools, logistics and content of theoretical academic activities, our data show that residents perceive a greater workload associated with academic and care activities, higher levels of stress, and less enjoyment of daily activities. These findings are consistent with previous publications (35,40,44–46). Meo et al, evaluated the impact of two weeks of quarantine on the mental well-being and learning behaviors of medical students at King Saud University in Riyadh, Saudi Arabia (47). They found high levels of stress and changes in student learning behavior, and approximately 25% reported depression and discouraging, with feelings of emotional separation from family, friends and peers. Changes perceived by residents may be related to the very nature of the SARS-CoV2/COVID-19 pandemic, with high levels of contagion, without effective treatment, other than prevention measures (44).

In our knowledge this is the first study evaluating the satisfaction with medical training, and perception of change in postgraduate students of internal medicine and sub-specialties, in relation with strategies including a virtual component implemented during the SARS-CoV2/COVID-19, pandemic. Previous studies have focused mainly on assessing the impact on under graduate students. As limitations, our study had a relatively small sample size, which limited subgroup comparison, however, the response rate was slightly higher than 50%, which is high for this kind of studies considering the voluntary participation, and it was performed at Colombia's largest internal medicine department. A second limitation is that the survey assessed the perception of a relatively short pandemic lapse (2 months). It is unknown if the satisfaction and perception of change could be different in longer periods of time

## Conclusions

Residents and fellows of the Department of Internal Medicine of the Pontificia Universidad Javeriana y el Hospital Universitario in Bogotá (Colombia), are mostly satisfied with the logistics organization, content, accompaniment in activities, technological tools used and interaction with other health professionals. However, they consider that the quality of their medical education deteriorated, the workload worsened, the opportunity to develop and practice skills was reduced as well as the availability of time for self-study and extracurricular activities, with an increase in perceived stress level and a decrease in the enjoyment of their daily activities. These findings suggest that new strategies are needed to improve practical components of medical education while maintaining social distancing.

## Abbreviations

TyP Agreement (Totally Agree and Partially Agree).

Med Int (Residents of Internal Medicine).

Other programs (Residents of Dermatology, Geriatrics, Fellows of Cardiology, Nephrology, Gastroenterology, Endocrinology).

RI (First Year Residents).

RF (Second, Third, Fourth Year Residents and Fellows).

Partially and Significantly Improved (PSI).

Did not Change (DC).

Partially and Significantly Worsened (PSW).

## Declarations

Ethics approval and consent to participate

The study was approved by the research and ethics committee of the Faculty of Medicine of the Pontificia Universidad Javeriana in Bogotá, Colombia. Committee's reference number FM-CIE-0746-20. Participation in the survey was voluntary and anonymous, verbal informed consent was obtained from all participants and it was also approved by the research and ethics committee of the Faculty of Medicine of the Pontificia Universidad Javeriana.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interest

The authors declare that they have no competing interests.

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Authors contributions: All the authors participated in the design, Analysis, and Writing of final manuscript. R.C Collected the data and wrote initial draft.

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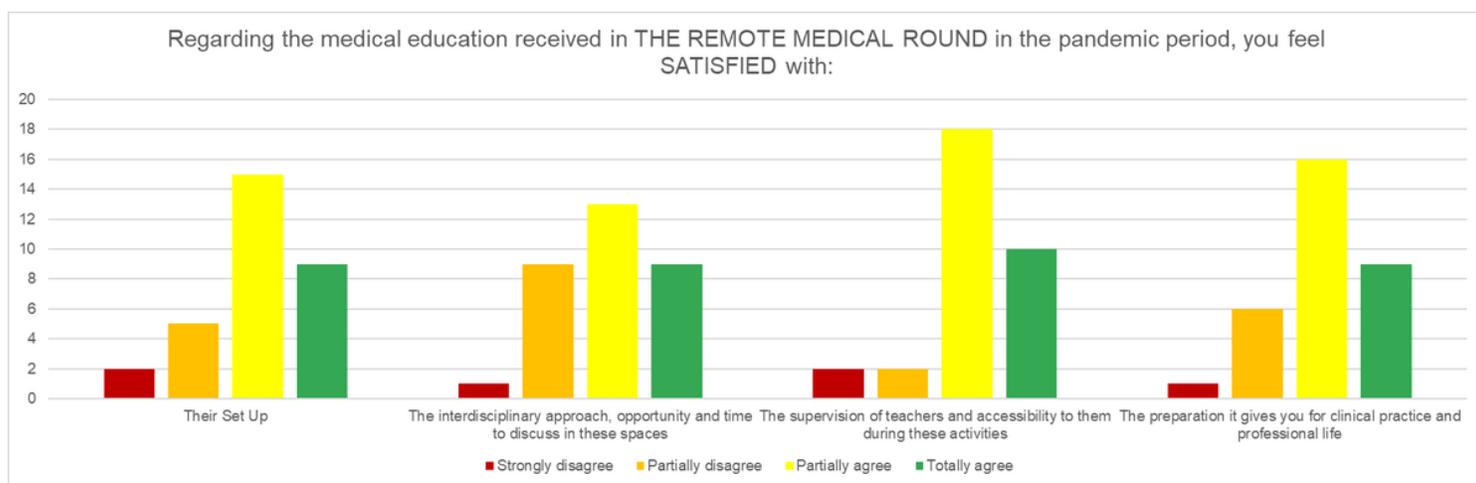
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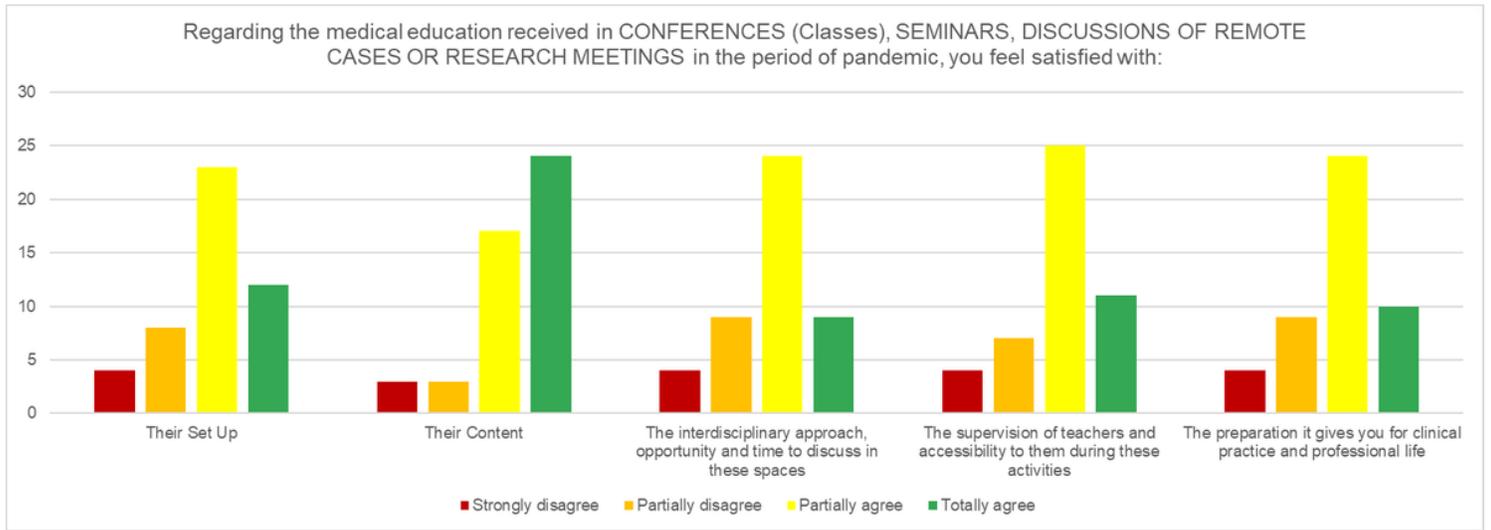
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## Figures



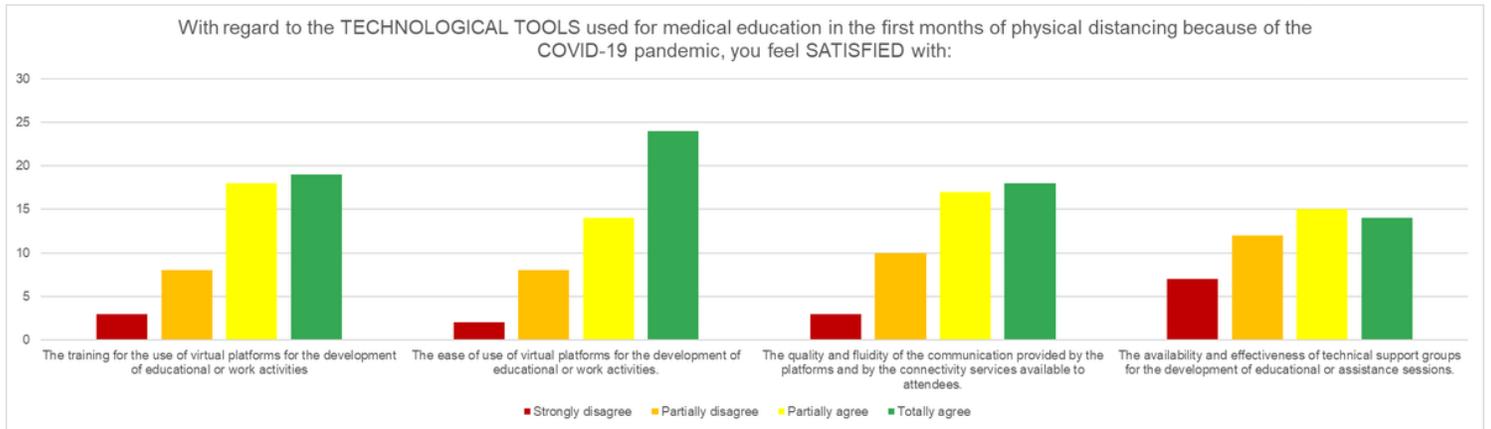
**Figure 1**

Residents satisfaction with the different theoretical academic activities of the Department of Internal Medicine.



**Figure 2**

Residents' satisfaction with Medical Rounds in which at least one member has remote activity.



**Figure 3**

Satisfaction with the Technological Tools used in the first months of the SARS-CoV-2-COVID-19 pandemic.

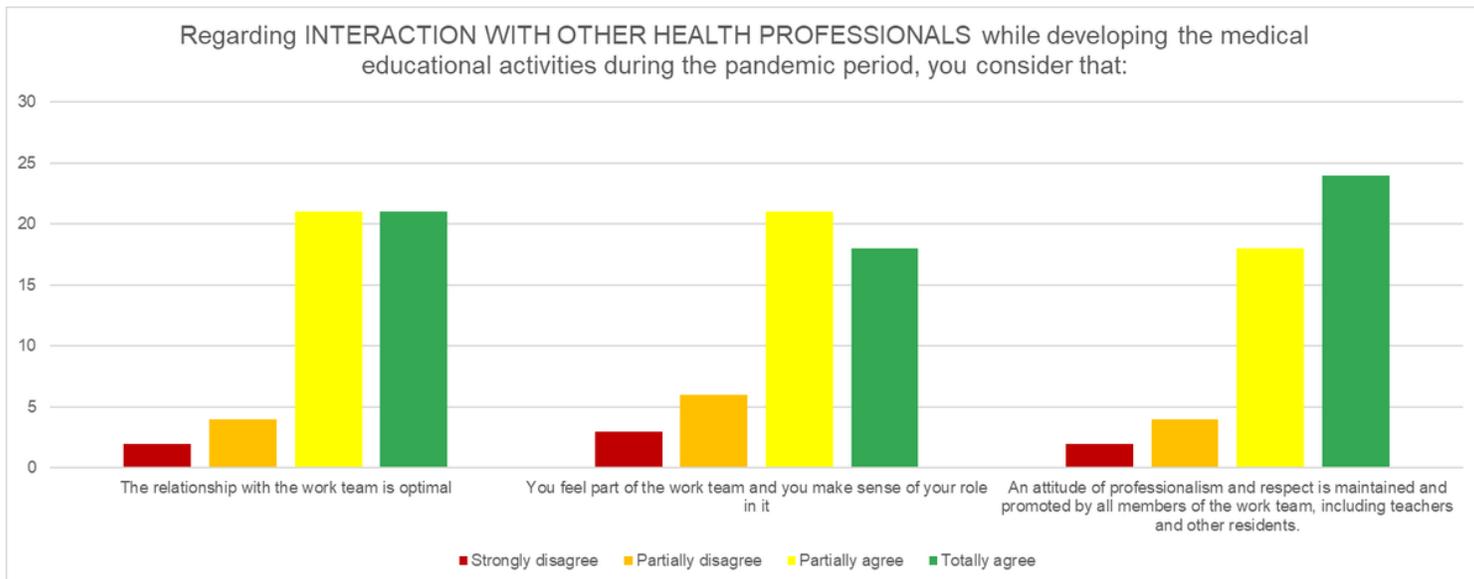


Figure 4

Satisfaction regarding interaction with other healthcare professionals, during the pandemic period of SARS-CoV-2-COVID-19.

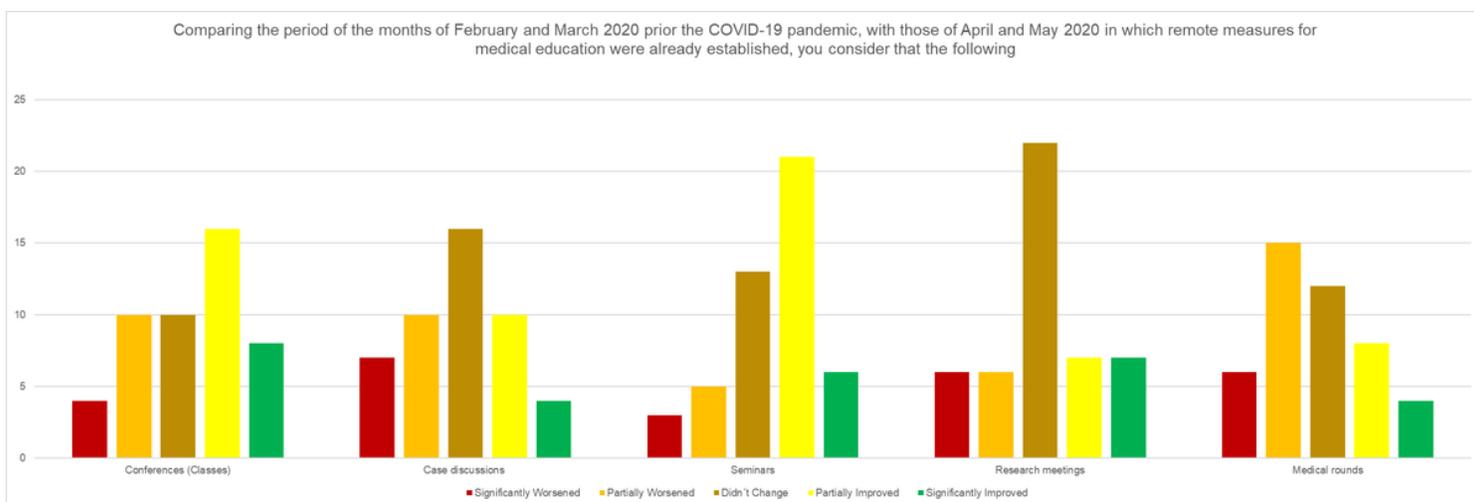
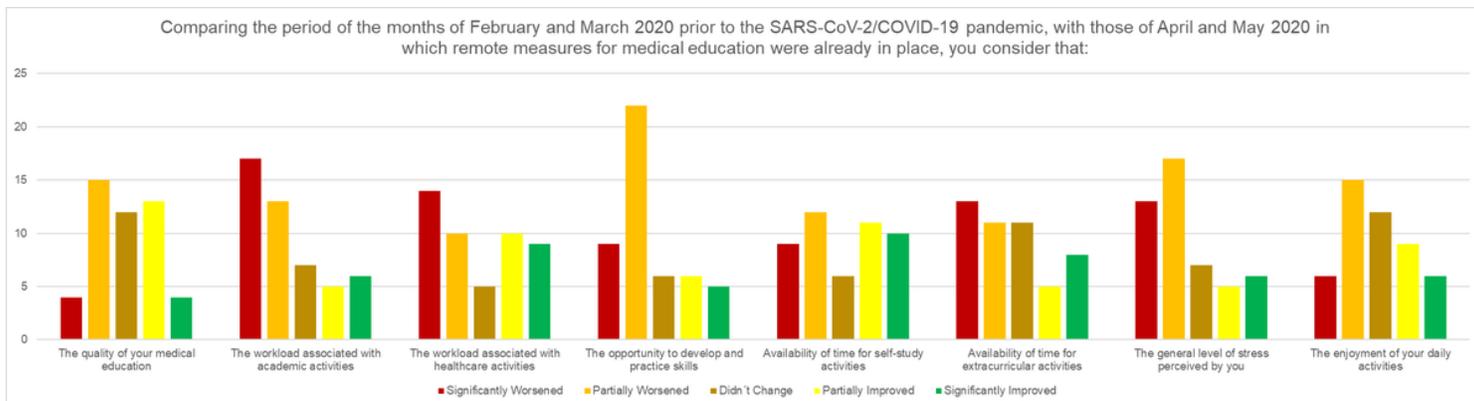


Figure 5

Perception of change with respect to the academic activities in the predemic and pandemic periods.



## Figure 6

Perception of change with respect to the working environment.

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Supplementary.docx](#)
- [copyofthequestionnaireused.docx](#)