Balancing assessment load and effectiveness in medical education during the pandemic: Students' insights

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Abstract. *Background and aim:* The COVID-19 pandemic has significantly impacted medical education, forcing institutions to adapt to remote learning and assessment methods. This study aimed to explore medical students' perceptions of their assessment load, quality, and impact on learning during the pandemic at a university in São Paulo, Brazil. *Methods:* A cross-sectional study with a quantitative approach and qualitative perspective was conducted. Ninety-one sixth-semester undergraduate medical students completed an online questionnaire assessing their perceptions of three assessment tools (online TBL, guided study, and pre-post-test) using Likert scales. Descriptive statistics and Spearman correlation coefficients were used for data analysis. *Results:* Guided study was the most effective tool in promoting student engagement and learning, while online TBL was perceived as the least useful. The assessment load was considered manageable by most participants, and no correlation was found between the effort dedicated to assessment tools and perceived study load. A positive correlation was observed between the usefulness of tools in conducting learning and the development of ethical concepts. *Conclusions:* The findings highlight the importance of adapting assessment strategies to the remote learning environment, considering students' preferences and needs. Further research is needed on the long-term impact of remote learning and assessment on medical students' professional and ethical development. (www.actabiomedica.it)

Key words: COVID-19, medical education, assessment, student perception, remote learning

Introduction

The COVID-19 pandemic has exposed significant weaknesses in current medical education models, highlighting the need for adaptations and improvements to ensure the continuity and quality of medical training (1). In Brazil, the pandemic has become one of the most impactful public health issues in recent history, affecting society on multiple levels and causing unprecedented disruptions in various sectors, including education (2). The abrupt changes in the educational process medical and other health courses have demanded emergency remodeling and dialogue among educators, managers, and society to find effective solutions (3).

The impact of the pandemic on the training of future doctors has been a global concern (4). Medical schools worldwide have faced challenges in adapting their training processes to the pandemic scenario, such as reduced workloads, displacement of activities, anticipation of graduations, and increased use of distance education technologies (5). These changes can significantly impact the execution of the original pedagogical project and the national curriculum guidelines, potentially affecting the quality of medical education (6). Brazilian medical schools' initial response was similar that of other countries (4,7,8), with the immediate suspension of curricular internships and the implementation of strategies to mitigate the spread of SARS-CoV-2 (9).

Assessment plays a crucial role in higher education learning (10–12). Students' learning is largely influenced by their perception of how they will be assessed (13). Assessment practices should provide students with accurate guidance on what and how to learn (14). However, students often receive incorrect signals, leading to misaligned learning strategies (15). Therefore, it is essential to examine students' perceptions of assessment objectives, the relationship between assessment and the nature of what is being assessed, and how different assessment formats affect learning (16). In addition to students' perceptions, educators' perceptions and direct learning measures should also be considered to ensure an accurate evaluation of the learning process (3).

The shift to remote learning during the pandemic has raised concerns about the effectiveness of assessment practices in this new context (17). The sudden transition to online platforms and the lack of face-to-face interaction may affect students' engagement and performance in assessments (18). Moreover, the increased stress and anxiety experienced by students during the pandemic may influence their perception of assessment load and its impact on their learning (19).

This study aimed to explore medical students' perceptions of their assessment load, as well as the quality and impact of assessment and feedback on their learning during the COVID-19 pandemic. The study was conducted in the context of an undergraduate medical course at a university in the metropolitan area of São Paulo, Brazil. By understanding students' experiences and perspectives, this research seeks to provide valuable insights into the effectiveness of assessment practices in remote learning environments and inform future adaptations in medical education.

Methodology

Study design and setting

This cross-sectional study employed a quantitative approach with a qualitative perspective. The study was conducted at the Universidade de Santo Amaro - UNISA (University of Santo Amaro - UNISA), located in São Paulo, Brazil, in May 2020, coinciding with the end of the academic semester.

Sample and data collection

The study sample consisted of 91 students enrolled in the sixth semester of undergraduate medicine at UNISA. The sample size was determined using a confidence level of 95% and a margin of error of 5%, resulting in a required sample size of 88 students. A convenience sampling method was used to recruit participants.

An adapted online questionnaire (Google Forms) (20) was sent to the email addresses of 6th semester students of the medical program, which corresponds to the third year of the six-year course. The questionnaire was divided into two sections. The first section included questions about the demographic characteristics of the participants (age group, gender, and semester). The second section comprised six statements related to the participants' assessment perceptions. The Free and Informed Consent Term (ICF) was on the first page of the questionnaire, and access was only allowed if the student agreed to participate in the research. The questionnaire was anonymous, except for the age, sex, and semester fields.

Three assessment tools were used during the period of remote classes: online TBL (Team-Based Learning), guided study, and pre and post-test.

Students' perceptions of the accuracy of each tool in reflecting the effort invested in learning and content knowledge were evaluated using a 4-point Likert scale (0 = not applicable, 1 = not very accurate, 2 = moderately accurate, 3 = very accurate). A 5-point Likert scale was used to assess the rating of the assessment load (very light = 1, light = 2, neither light nor heavy = 3, heavy = 4, very heavy = 5) and the usefulness of the assessment (0 = not applicable, not at all useful = 1, not very useful = 2, useful = 3, very useful = 4). Participants were also asked to select the best descriptor (1 out of 3) of their assessment perception. The last question invited participants to provide free-text comments about the assessment they would like to change. Based on the Ethics Committee (CEP) approval date of August 18, 2020, the following schedule was adopted: study start date August 18, 2020, and study end date November 16, 2020.

We conducted a reliability analysis of our questionnaire, and the Cronbach's alpha coefficient was 0.87. This value indicates high reliability and internal consistency of the survey instrument, as it is above the generally accepted threshold of 0.70 for good internal consistency.

The survey was originally constructed in Brazilian Portuguese and administered in Brazilian Portuguese to native speakers. This approach eliminated the need for translation and ensured that the questions were culturally and linguistically appropriate for our target population.

In addition to the Cronbach's alpha, we employed other methods to validate our questionnaire: Content validity (the questionnaire was reviewed by a panel of experts in medical education to ensure that it adequately covered the domain of interest); Face validity (we conducted a pilot test with a small group of medical students, not included in the final sample, to ensure clarity and comprehensibility of the questions). Construct validity (we performed a factor analysis, which revealed a clear factor structure aligning with our theoretical constructs).

To prepare students for providing their perceptions of assessments, we implemented the following strategy: (a) One week before the questionnaire distribution, students received an informational email explaining the purpose of the study and the importance of their honest feedback; (b) We organized a brief online orientation session where we explained the concept of educational assessment and its role in their learning process; (c) Students were provided with a glossary of terms related to assessment methods to ensure a common understanding; (d) We emphasized the anonymity of the responses to encourage candid feedback; (e) A dedicated email address was set up for students to ask questions or seek clarification about the questionnaire.

Data analysis

The responses were organized in Excel spreadsheets and exported to IBM SPSS Statistics version 24 (IBM Corporation, NY, USA) (21) for analysis. Descriptive statistics, including absolute and relative frequencies, were used for categorical variables. The Spearman correlation coefficient was used to analyze the correlation between two ordinal variables, with values ranging from -1 to +1. A perfect positive linear correlation is assumed when the value is close to +1, and a perfect negative linear correlation when close to -1. Values close to zero indicate the absence of correlation. P-values less than 0.05 were considered statistically significant.

Results

Sample characteristics

The study sample consisted of 91 students, with a female predominance (n=65; 71.4%). The majority of participants were aged between 20 and 25 years (n=78; 85.7%).

Students' perception of assessment tools

Guided study was the tool that reflected the highest level of effort dedicated by students to learning, with 42 (46.2%) participants choosing the "*very accurate*" response. For both online TBL and pre- and post-test, most students stated that these tools had an intermediate influence on their study efforts (Table 1).

Table 1. Students' perception of the accuracy with which the tool reflected the effort dedicated to learning. (n = 91, UNISA, 2024)

	On-line TBL		Directed Study		Pre and Post Test	
	N	%	N	%	N	%
Little accurate	34	37.4	8	8.8	37	40.7
Moderately accurate	51	56.0	40	44.0	45	49.5
Very accurate	5	5,5	42	4.2	8	8.8
Not applicable*	1	1.1	1	1.1	1	1.1
Total	91	100	91	100	91	100

*It did not carry out this type of strategy at any time.

Table 2. Students' perception of the accuracy with which the tool reflected the knowledge of the content. (n = 91, UNISA, 2024)

	On-line TBL		Directed Study		Pre and Post Test	
	N	%	N	%	N	%
Little accurate	44	48.4	9	9.9	37	40.7
Moderately accurate	39	42.9	50	54.9	41	45.1
Very accurate	7	7.7	31	34.1	12	13.2
Not applicable*	1	1.1	1	1.1	1	1.1
Total	91	100	91	100	91	100

*It did not carry out this type of strategy at any time.

Regarding the impact of the tools on content knowledge, none was declared as "*very accurate*" by the majority of the sample (Table 2). Online TBL was considered the least effective assessment by 44 (48.4%) participants. Guided study and pre- and post-test were judged as "*moderately accurate*" by 50 (54.9%) and 41 (45.1%) students, respectively.

When asked about the usefulness of each tool in guiding learning, most students declared guided study as a "very useful" instrument 43 (47.3%), while online TBL was considered "not very useful" by 43 (47.3%) participants. The pre- and post-test tool was considered "useful" by the largest number of participants, 38 (41.8%) (Table 3).

Assessment load and perception

Regarding the load of assessment tools during the study semester, 56 (61.5%) students stated that it was neither light nor heavy, while 23 (25.3%) found it heavy.

More than half of the students, 52 (57.1%) said that assessment helps to identify current gaps in learning (Figure 1). However, 43 (47.3%) stated that assessment does not quantify the level of knowledge or allow addressing learning failures.

    a.   Assessment quantifies my level of knowledge and/or competence.

Table 3. Students' perception of the usefulness of tools in conducting their learning. (n = 91, UNISA, 2024)

	On-line TBL		Directed Study		Pre and Post Test	
	N	%	N	%	N	%
Nothing useful	7	7.7	1	1.1	8	8.8
Nothing very useful	43	47.3	11	12.1	31	34.1
Useful	35	38.5	35	38.5	38	41.8
Very useful	5	5.5	43	47.3	13	14.3
Not applicable*	1	1.1	1	1.1	1	1.1
Total	91	100	91	100	91	100

*It did not carry out this type of strategy at any time.

    b.   Assessment helps me identify current gaps in my learning.

    c.   Assessment allows me to address gaps in my learning.

Regarding the perception of distance assessments as an additional strategy for personal and professional development, 38 (41.8%) students considered that they would have little interference, while "48 (52.7%)" said they would have some kind of positive influence (Figure 2).

Almost 82 (90.1%) students considered the assessment methodologies useful for developing ethical concepts to some extent (Figure 3).
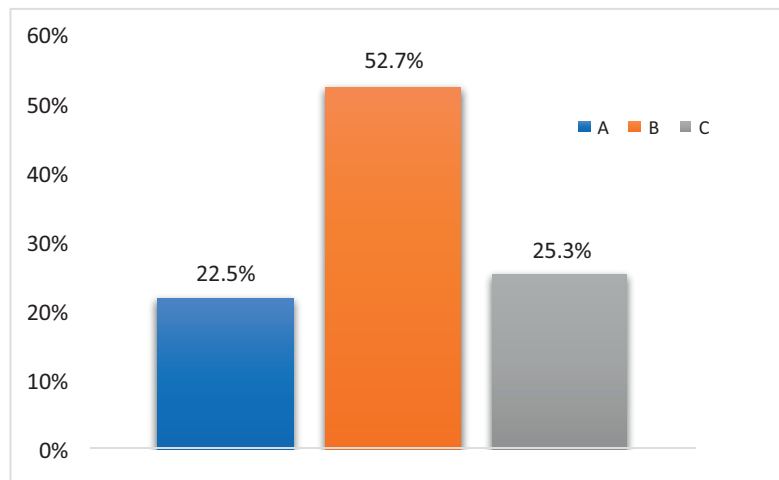
Figure 1. Distribution of participants' responses on how they perceive the assessment. (n = 91, UNISA, 2024)
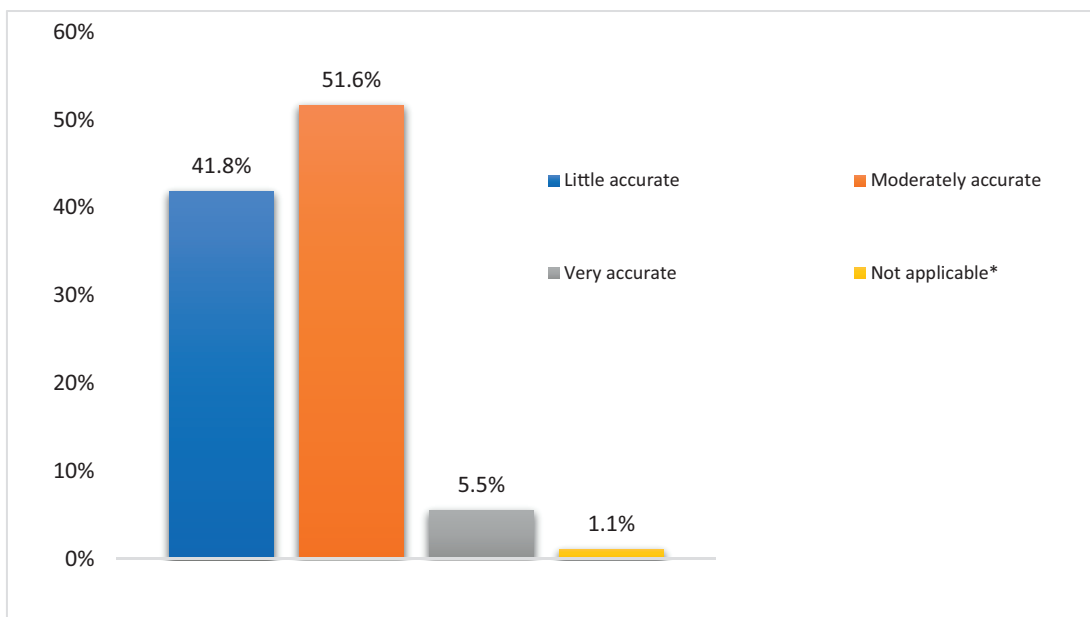

Figure 2. Distribution of students' responses on the perception that distance assessments are an additional strategy for their personal and professional development. (n = 91, UNISA, 2024)

*It did not carry out this type of strategy at any time.

Correlation analysis

The Spearman correlation coefficients between the perception of effort dedicated to the three methods and the perception of the semester load were close to zero (p>0.05), indicating no significant correlation.

A positive correlation was found between the usefulness of tools in conducting learning and the usefulness of methodologies in developing ethical concepts (Table 4).
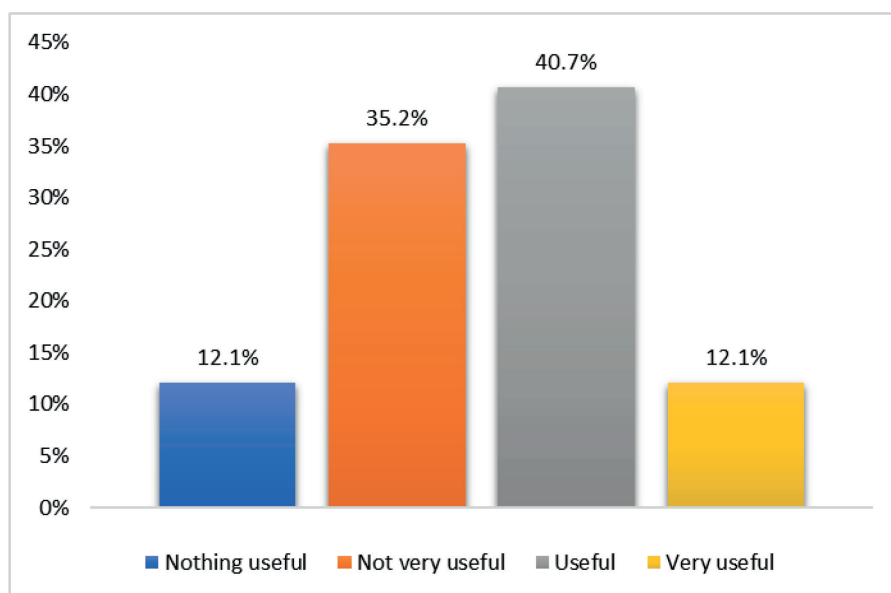
Figure 3. Distribution of students' responses regarding the usefulness of the methodologies used for the development of ethical concepts ("*You are alone and nobody takes care of you in solving problems, only your conscience*"). (n = 91, UNISA, 2024)

Table 4. Correlation analysis between the perception of the usefulness of tools in conducting learning and the usefulness of methodologies in the development of ethical concepts. (n = 91, UNISA, 2024)

Usefulness of tools in conducting learning**	Development of ethical concepts*	
	r_s	p value
On-line TBL	0,484	<0,001
Directed Study	0,287	0,006
Pre and Post Test	0,329	0,001

* How useful are the methodologies used to develop your ethical concepts (you are alone and nobody takes care of you in solving problems, only your conscience)?
** How useful is the tool in conducting your learning (learning and not for the final grade)?
rs, Spearman correlation coefficient.

Discussion

The COVID-19 pandemic has brought unprecedented challenges to medical education worldwide, forcing institutions to rapidly adapt to remote learning and assessment methods (22,23). This study aimed to explore medical students' perceptions of their assessment load, as well as the quality and impact of assessment and feedback on their learning during this challenging period. The findings provide valuable insights into the effectiveness of different assessment tools and the factors influencing students' preferences and engagement (24–27).

The results showed that guided study was the assessment method that best contributed to the students' commitment to the studying and had the lowest percentage of rejection. This preference can be attributed to the increased time and flexibility provided for research and understanding of the contents, which is particularly important given the process of adapting to the new remote learning environment (2). The guided study method allows students to consolidate their knowledge through a combination of teacher explanation, exercises, and problem-solving, as emphasized by Libâneo (28). This approach may have been more effective in promoting student engagement and self-directed learning compared to other assessment tools used in the study.

Our study focuses on sixth-semester medical students during their pediatrics rotation, a critical juncture in their medical education. This timing is

especially significant as it coincides with the unprecedented challenges posed by the COVID-19 pandemic. The study captures the students' perceptions during this extraordinary period, providing invaluable insights into the adaptation of medical education to remote learning environments.

In contrast, the online TBL (Team-Based Learning) was considered the least effective assessment method by the participants. This finding is surprising, as previous studies have reported positive perceptions of TBL among medical students. For example, Oliveira et al. (29) found that medical students evaluated TBL as a very useful methodology for the learning process and training evaluation. The discrepancy between the present study and previous findings suggests that the effectiveness of TBL may be compromised when conducted remotely. The lack of in-person interaction among students and connectivity issues may have hindered the successful implementation of TBL in the virtual environment, as suggested by Silva Jr et al. (30). This highlights the need for further research on adapting TBL and other collaborative learning strategies to the remote setting, ensuring that students can benefit from the advantages of peer interaction and teamwork.

We specifically examined the implementation of Team-Based Learning (TBL) in an online format. This approach is particularly novel in the context of pediatric education, where hands-on clinical experience is traditionally emphasized. Our study provides crucial data on how innovative teaching methodologies like TBL can be adapted to remote settings without compromising the quality of medical education.

The assessment load during the semester was considered intermediate by most participants, and no correlation was found between the effort dedicated to the assessment tools and the perceived study load. This finding is encouraging, as it suggests that the assessment tools did not contribute to increased mental fatigue among students, despite the significant changes in the educational process during the pandemic (31). Previous studies have reported high rates of depression, anxiety, and sleep disturbances among medical students in response to the demands of the new educational reality (19,25,32–34). The fact that the assessment load was perceived as manageable by most participants in the present study may indicate that the institution has successfully adapted its assessment strategies to the remote learning environment, considering the well-being and workload of students (35).

Unlike many studies that focus on a single assessment method, our research evaluates and compares multiple assessment tools, including online TBL, guided study, and traditional exams. This comprehensive approach allows for a nuanced understanding of the strengths and limitations of each method in the context of remote learning.

The majority of participants recognized the role of assessment in identifying learning gaps and quantifying competencies, which aligns with the perspectives of Ferreira & Tavares (36) and Gasparin (37). This finding suggests that most students understand the formative purpose of assessment and its potential to guide their learning process. However, a quarter of the sample did not perceive assessment as a tool for self-assessment and addressing learning gaps (38). This lack of recognition may have influenced their preferences for specific assessment methods and their overall engagement with the assessment process. Educators should strive to communicate the importance of assessment as a means of self-reflection and continuous improvement, encouraging students to actively participate in the assessment process and use feedback to address their learning needs (39).

By exploring students' perceptions, our study places the learner at the center of the educational process. This approach aligns with modern pedagogical theories that emphasize the importance of student engagement and feedback in shaping effective educational strategies.

The study also explored students' perceptions of the usefulness of distance assessments for personal and professional development, as well as the development of ethical concepts. The results were mixed, with only a small percentage considering distance assessments as very efficient for these purposes. This finding raises questions about the long-term impact of remote learning and assessment on students' professional and ethical development. While the immediate focus during the pandemic has been on ensuring the continuity of medical education, it is crucial to consider the broader implications of the shift to remote learning on the acquisition of essential skills, values, and attitudes required for future medical practice.

The findings of our study have immediate and practical implications for medical educators and institutions. By identifying which assessment methods students find most effective in a remote learning environment, we provide valuable guidance for curriculum development and assessment design in medical education, both during and beyond the pandemic.

Strengths and limitations

Our research adds to the growing body of literature on how medical education can adapt and thrive in times of crisis. By focusing on the specific challenges and opportunities in pediatric education, we fill a gap in the current understanding of remote learning in specialized medical fields.

Our study employs a mixed-methods approach, combining quantitative data with qualitative insights. This methodology provides a more holistic view of students' experiences, capturing not just the effectiveness of assessment tools but also the emotional and psychological impact of these methods during a challenging time.

The present study has several limitations that should be acknowledged. First, the sample was limited to a single medical school, which may limit the generalizability of the findings to other institutions and contexts. Second, the study relied on self-reported data, which may be subject to response bias and social desirability bias. Future research could incorporate objective measures of student performance and engagement to complement the subjective perceptions reported in this study. Finally, the cross-sectional design of the study does not allow for causal inferences about the impact of assessment methods on student learning outcomes.

Future perspectives

Further research is needed to investigate the long-term outcomes of remote learning and assessment on students' professional identity formation and ethical reasoning abilities (11). Longitudinal studies are needed to track the long-term effects of remote learning and assessment on medical students' academic and professional development, as well as the effectiveness of collaborative learning strategies in the virtual environment.

While our study provides a snapshot of student perceptions at a critical time, it also lays the groundwork for potential longitudinal studies. This could lead to a deeper understanding of how these experiences and adaptations in medical education might influence future physicians' practices and approaches to lifelong learning.

Conclusions

This study provides valuable insights into medical students' perceptions of assessment during the COVID-19 pandemic. Guided study emerged as the most effective assessment method in promoting student engagement and learning, while the online TBL was perceived as the least useful. The assessment load was considered manageable by most participants, and no correlation was found between the effort dedicated to assessment tools and the perceived study load.

The findings underscore the importance of adapting assessment strategies to the remote learning environment and addressing the challenges posed by the pandemic. Medical educators should consider the preferences and needs of students when designing assessment tools and provide adequate support and resources to facilitate effective learning.

The study also highlights the need for further research on the long-term impact of remote learning and assessment on medical students' professional and ethical development. As the pandemic continues to shape the landscape of medical education, it is crucial to develop evidence-based strategies to ensure the quality and effectiveness of assessment in promoting student learning and growth.

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