






## Satisfacción de la enseñanza mediante la modalidad virtual vs presencial en los estudiantes de la carrera de medicina en tiempos de SARS-CoV-2

*Teaching satisfaction scale through virtual vs. face-to-face modality in medical students in times of SARS-CoV-2*

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**Palabras claves:**

Satisfacción, SARS-CoV-2, Percepción, modalidad virtual, estudiante de medicina

**Keywords:**

Teaching satisfaction scale, SARS-CoV-2, Perception, virtual modality, medical student

**Resumen**

**Introducción:** La emergencia sanitaria global requirió implantar medidas de confinamiento, en este marco de acción las instituciones de educación superior, al considerarse centros de aglomeración tuvieron que adaptarse para mantener un distanciamiento social. **Objetivo:** determinar el nivel de satisfacción al adquirir conocimiento mediante la modalidad virtual vs presencial en los estudiantes de la carrera de medicina en tiempos de SARS-CoV-2. **Metodología:** se trata de un estudio prospectivo observacional de corte transversal ejecutado en una institución de educación superior pública de la República del Ecuador, durante el periodo diciembre 2020 – enero 2021, en el marco del confinamiento por la pandemia por SARS-CoV-2. Para lo que se utilizó un instrumento de evaluación aprobado por un experto en educación y validado mediante el coeficiente de Alpha de Cronbach, con una muestra de 299 participantes. **Resultados:** el nivel de satisfacción general de los estudiantes, al adquirir conocimientos mediante la modalidad virtual fue mayoritariamente insatisfactorio, relacionada a factores como conectividad, tiempo de estudio, interés del estudiante y estructura de las clases. **Conclusión:** la modalidad virtual en países como Ecuador podría no ser lo suficientemente eficiente para generar en los estudiantes una percepción satisfactoria. **Área de estudio general:** medicina. **Área de estudio específica:** educación en ciencias de la salud. **Tipo de estudio:** original.

**Abstract**

**Introduction:** The global health emergency required the implementation of confinement measures, in this framework of action, higher education institutions, being considered agglomeration centers, had to adapt to maintain social distancing. **Objective:** To determine the level of satisfaction when acquiring knowledge through the virtual vs. Face-to-face modality in medical students in times of SARS-CoV-2. **Methodology:** This is a prospective, observational, cross-sectional study conducted in a public higher education institution in the Republic of Ecuador, during the period December 2020 – January 2021, within the framework of the

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confinement due to the SARS-CoV-2 pandemic . An evaluation instrument approved by an education expert and validated using Cronbach's alpha coefficient was used with a sample of 299 participants. Results: The general level of satisfaction of the students, when acquiring knowledge through the virtual modality, was mostly unsatisfactory, related to factors such as connectivity, study time, student interest and class structure. Conclusion: the virtual modality in countries such as Ecuador may not be efficient enough to generate a satisfactory perception in students. General Area of Study: Medicine. Specific area of study: health sciences education. Type of study: original.

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## Introduction

The global health emergency required the implementation of confinement measures. Within this framework of action, higher education institutions, being considered centers of agglomeration, had to adapt to maintain social distancing. A common measure, which was taken by several countries, was to limit or close educational centers, at all levels (1), a measure that is estimated to affect 1.5 billion students enrolled worldwide, which represents 91.3% of the total number of students in the world according to UNESCO data (2). Value that UNESCO itself reports has gradually decreased, probably due to the reduction of confinement measures.

In Ecuador, the Ministry of Education issued a statement ceasing academic activities on March 12, 2020, and on March 16 of the same year, the Covid-19 Educational Plan (3) was presented to the population, thus implementing guidelines for teachers and students, who continued classes in a virtual mode.

Many of the actions and measures taken are the result of adjustment to the emergency and not as a result of prior planning. Having as a background, that the course has been structured to be taught in a face-to-face model or in a few cases semi-face-to-face, means that teachers and students face new challenges in terms of the adaptation, effectiveness and success of a new methodology, as well as the appropriate use of technology (4).

In the context of the health emergency, one of the challenges has been that, for both teachers and students, there may be problems regarding access to electronic devices, such as an internet connection (5). In addition, the time available to each person to access the devices must be taken into account.

In this context, this study aims to determine the level of satisfaction with knowledge between virtual vs. face-to-face modality in medical students in times of SARS-CoV-2.

### Methodology

This is a prospective, observational, cross-sectional study carried out in a public higher education institution in Ecuador, during the period December 2020 - January 2021, within the framework of the confinement due to the SARS-CoV-2 pandemic. The participants were medical students legally enrolled in the second semester of 2020, of both sexes, predominantly women, aged between 17 and 24 years.

The variables studied were perception of the virtual modality and consolidation of knowledge, availability of resources and technological means to study in virtual modality, perception of the exercise of teaching and teacher-student relationship through virtual means, and attitudes and development of the student in the virtual modality. The instrument used was a multiple choice survey made up of three blocks, the first consisting of the presentation of the research and informed consent, the second containing questions whose answers were qualitative and the third whose answers were quantitative.

When designing the instrument, the work of Lozano-Díaz, Fernández-Prados and collaborators (6) was taken as a reference. Once the new instrument specific to the present investigation was constructed, it was validated through a pilot test, obtaining a Cronbach's  $\alpha$  of 0.943. To study the population, consisting of 1,168 students, a simple random sampling was carried out, defining a sample of 299 subjects, with 95% confidence and 5% margin of error. The subjects were contacted through institutional email and social networks, providing them with the instrument.

The results are expressed through frequency tables and a summary table of the variables in which association was identified using the Chi2 test. The research protocol was approved by a bioethics committee, all participants accepted informed consent and no information that could potentially identify the participants was collected.

### Results and discussion

Table 1 describes the following. The items in section one: Quality of the virtual modality and Ease of learning show the degree of “disagreement” (36.1%) and (44.10%) respectively. The items in section two: Adequate devices and Internet capacity, show that the majority is “in agreement” (46.8% and 33.4%) respectively, but for the items Audio quality and Quality of teacher transmission the majority is “neither agree nor disagree” (37.1% and 37.8%). The items in section three: Timely upload of the material, Quality of the transmitted material; the majority is “in agreement” (39.5%), (36.5%) respectively and in Clarity of instructions “neither agree nor disagree” (31.8%). The items in section four: Satisfaction with the teacher/student relationship and Timely response from the

teacher; the majority is “neither agree nor disagree, (33.8%) and (37.8%) respectively and for the Satisfaction with the teachers' responses and Teacher's willingness to respond, the majority is “agree” (39.1%) and (43.8%) respectively. The items in section five: Distraction during the virtual class and Review the material, the majority is “agree” (34.1%) (50.8%) respectively, for the item Time spent studying, the majority is disagree or (33.1%). The item in section six: My university was prepared for the virtual modality, the majority is “disagree” (29.8%).

The item in section seven: Sufficiency of time to learn, the majority “disagree” (32.8%). The items in section eight, Confidence in the suitability of skills/abilities, Feeling of competence and I successfully complete the virtual course, the majority “agree” (38.8%) (48.8%) and (39.8%) respectively. The items in section nine: Hours per day of study and Hours per day using mobile phone, use 3-4 hours daily, (40.8%) (32.8%) respectively, for the item Hours of phone use in academic activities, the majority use, “more than 6 hours” (50.5%).

*Table 1. Distribution of participants' responses to the qualitative statements*

N = 299					
Statement	Totally disagree	Disagree	Neither agree nor disagree	OK	Totally agree
<b>Section</b>					
Perception of the quality of what has been learned					
The quality of the virtual modality is adequate to consolidate knowledge.	85 (28.4%)	108 (36.1%)	79 (26.4%)	22 (7.4%)	5 (1.7%)
I learn as easily as if it were the face-to-face modality.	132 (44.10%)	102 (34.1%)	36 (12%)	25 (8.4%)	4 (1.3%)
<b>Section</b>					
Ease of technological access for students					
The devices I have are suitable for virtual mode.	16 (5.4%)	25 (8.4%)	58 (19.4%)	140 (46.8%)	60 (20.1%)

**Table 1.** Distribution of participants' responses to qualitative statements (continued)

N = 299					
Statement	Totally disagree	Disagree	Neither agree nor disagree	OK	Totally agree
My internet is able to support virtual classes satisfactorily.	22 (7.4%)	74 (24.7%)	59 (19.7%)	100 (33.4%)	44 (14.7%)
The audio quality during classes is adequate.	22 (7.4%)	68 (22.7%)	111 (37.1%)	80 (26.8%)	18 (6%)
I am satisfied with the quality of the teacher's transmission and audio/video.	32 (10.7%)	43 (14.4%)	113 (37.8%)	99 (33.1%)	12 (4%)
<b>Section</b>					
<b>Satisfaction with the teacher's explanation and material</b>					
The teacher uploads the material (recorded classes, slides) in a timely manner.	21 (7%)	30 (10%)	75 (25.1%)	118 (39.5%)	55 (18.4%)
I am satisfied with the quality of the material provided by the teacher (slides, summaries, etc.).	24 (8%)	44 (14.7%)	95 (31.8%)	109 (36.5%)	27 (9%)
The task instructions are clear and precise.	46 (15.4%)	50 (16.7%)	95 (31.8%)	93 (31.1%)	15 (5%)
<b>Section</b>					
<b>Teacher Student Interaction</b>					
I am satisfied with the teacher-student relationship.	39 (13%)	63 (21.1%)	101 (33.8%)	79 (26.4%)	17 (5.7%)
The teacher responds promptly to messages sent to him.	28 (9.4%)	36 (12%)	113 (37.8%)	96 (32.1%)	26 (8.7%)
I am satisfied with the teacher's answers when I have questions.	22 (7.4%)	41 (13.7%)	91 (30.4%)	117 (39.1%)	28 (9.4%)
The teacher is willing to answer my questions.	14 (4.7%)	19 (6.4%)	105 (35.1%)	131 (43.8%)	30 (10%)
<b>Section</b>					
<b>Student Commitment</b>					
I get distracted during virtual classes.	11 (3.7%)	46 (15.4%)	75 (25.1%)	102 (34.1%)	65 (21.7%)
I review the material that is available on the platform.	8 (2.7%)	13 (4.3%)	48 (16.1%)	152 (50.8%)	78 (26.1%)



**Table 1.** Distribution of participants' responses to qualitative statements (continued)

N = 299						
Statement	Totally disagree	Disagree	Neither agree nor disagree	OK	Totally agree	
I spend the same amount of time studying as I did in person.	68 (22.7%)	99 (33.1%)	66 (22.1%)	47 (15.7%)	19 (6.4%)	
<b>Section</b> Preparing the university to work with the virtual modality						
My university was prepared to work using virtual modality.	85 (28.4%)	89 (29.8%)	84 (28.1%)	32 (10.7%)	9 (3%)	
<b>Section</b> Time invested in studying						
The time I spend in the virtual mode is enough to learn what I need.	74 (24.7%)	98 (32.8%)	80 (26.8%)	34 (11.4%)	13 (4.3%)	
<b>Section</b> My capabilities regarding what I am learning						
I am confident in the suitability of my academic skills and abilities.	28 (9.4%)	27 (9%)	75 (25.1%)	116 (38.8%)	53 (17.7%)	
I feel competent in completing my course tasks.	24 (8%)	25 (8.4%)	62 (20.7%)	146 (48.8%)	42 (14%)	
I have learned to successfully complete my courses efficiently in the virtual mode.	26 (8.7%)	32 (10.7%)	91 (30.4%)	119 (39.8%)	31 (10.4%)	

The results of the analysis show that more than half of the sample has a generally poor perception of the quality and ease of learning in the virtual modality compared to the face-to-face modality. On the other hand, the most relevant result shows that more than half of the sample (61.7%) reported feeling that the period covered by the virtual semester had been a wasted semester (Table 2).

**Table 2.** Qualitative statistical result

I feel like this has been a wasted year		Frequency	Percentage
Valid	Yeah	184	61.5
	No	115	38.5
Total		299	100.0

It has also been reported that low- and middle-income countries have difficulties in terms of infrastructure and Internet access; in addition, it must be taken into account that many online services require an investment in tools and licenses for use (7). In the present study, approximately one third of the sample reported being dissatisfied with their connection quality for virtual classes, a fact that coincides, since Ecuador is a middle-income country.

Although the study is not based on teachers, it is important to note that the need for a sudden change to an online teaching model requires a different pedagogical method (8). This has been a challenge in itself, since the adaptation of teachers is variable; as there is no previous structure that contemplates this situation, it has led to the fact that, in many cases, the class model has been imitated as it would have been in the face-to-face model (7, 9). This form of improvised solution, although it has allowed to maintain continuous education, cannot guarantee the same level of quality compared to face-to-face education (7, 10). This action is the result of an urgent need that cannot be compared to the implementation of a previous planning or proposals specifically designed for an online model (11).

It is important to keep this in mind, since this redesign was carried out for subjects that were initially designed to be taught and taken in person, and it was carried out under the assumption that students and teachers had the technological means and digital skills to carry out this migration (5).

Furthermore, when teaching a class, it is important to know that a video conference or providing reading material is not a totally optimal solution in itself, but that the entire experience must be completely redesigned to adapt it to the virtual format (12–14). It must be taken into account that the optimal duration of video conferences is between 20 and 30 minutes and that in the virtual classroom the number of students is minimal; this helps the interaction to be more focused and effective (15–17). Since it has been observed that massive, online, open courses, continuous assessment solutions alone are no longer feasible (18).



When carrying out an analytical study of the variables addressed, we identified a positive association through Pearson's Chi2 test between "I feel that this year has been a wasted year" and the group of variables in Table 3; in 12 of these, additionally, a moderate and direct intensity of association was identified, through the Gamma test; and a low and direct capacity of the group of variables individually, to predict the variable "I feel that this year has been a wasted year" through Sommers' D test. Regarding the variable "the time I spend in the virtual modality is enough to learn what I need" a high and direct intensity of association and a moderate and direct prediction capacity were identified.

**Table 3.** Results of statistical analysis of association

Statements	I feel like this has been a wasted year		
	Chi2 (p)	Gamma	D is for Sommers
The audio quality during classes is adequate	0	0.406	0.194
The teacher uploads the material in a timely manner	0	0.507	0.243
I am satisfied with the quality of the material transmitted by the teacher	0	0.581	0.283
Task instructions are clear and precise	0	0.491	0.237
I am satisfied with the teacher-student relationship	0	0.516	0.251
The teacher responds promptly to messages sent to him/her	0	0.382	0.184
I am satisfied with the teacher's answers when I have questions.	0	0.322	0.153
The teacher is willing to answer my questions	0.001	0.329	0.158
I spend the same amount of time studying as I did in the face-to-face modality	0	0.458	0.225
The time I spend in the virtual mode is enough to learn what I need.	0	0.663	0.336
I am confident in the suitability of my academic skills and abilities	0	0.385	0.184
I feel competent in completing my course tasks	0	0.519	0.247
I have learned to successfully complete my courses efficiently in the virtual mode	0	0.52	0.249

**Conclusion**

- The change to virtual education presents methodological and adaptation challenges for both teachers and students, but since there is no previous model that contemplates this change, the adaptation has been slow and insufficient. Although this has allowed the academic period to continue, the fact that this modality depends on the availability of devices and internet connection is a disadvantage in countries like Ecuador. When measuring learning satisfaction using the evaluation instrument, it was found that students have a poor perception and feelings of mistrust, in general, about the quality and suitability of this modality to efficiently and satisfactorily provide them with the necessary knowledge.

### **Conflict of interest**

The authors declare that they have no conflicts of interest that could compromise, in whole or in part, the results of this work or its publication.

### **Authors' contribution statement**

ITP and LAEC conceived the research idea, defined the problem and carried out an initial search for information.

GAFV and GNMO conducted the non-systematic search to build the database of articles and designed the information collection instrument.

ITP, LAEC and PDGV applied the research instrument and generated the tables.

PDGV supervised the development of the first draft by GAFV and GNMO.

PDGV applied the corrections to the first draft.

ITP and PDGV approved the final manuscript.

### *Bibliographic References*

1. COTEC Foundation. COVID-19 AND EDUCATION I: problems, responses and scenarios. Cotec Fund for Innovation [Internet]. 2020 [cited 2020 Jul 17];0(35):5. Available from: <https://online.flippingbook.com/view/967738/8/>
2. United Nations Educational S and CO. School closures caused by Coronavirus (Covid-19) [Internet]. UNESCO. 2020 [cited 2020 Jul 17]. Available from: <https://en.unesco.org/covid19/educationresponse>
3. Ministry of Education of Ecuador. Covid-19 Educational Plan [Internet]. 2019 [cited 2020 Jul 20]. Available from: <https://recursos2.educacion.gob.ec/>

4. García-Peñalvo FJ, Corell A, Abella-García V, Grande M. Online assessment in higher education in times of COVID-19. *Educ Knowl Soc* [Internet]. 2020 May 14; 21:26. Available from: <https://revistas.usal.es/index.php/eks/article/view/eks20202112/22274>
5. García-Peñalvo FJ, Corell A, Abella-García V, Grande M. Online assessment in higher education in the time of COVID-19. *Educ Knowl Soc* [Internet]. 2020 May 14 [cited 2020 Oct 24];21(0):26. Available from: <http://revistas.usal.es/index.php/eks/>
6. Lozano-Díaz A, Canosa VF, Fernández-Prados JS, Martínez AMM. Impacts of COVID-19 confinement among college students: Life satisfaction, resilience, and social capital online. *Int J Sociol Educ* [Internet]. 2020 Jun 20 [cited 2020 Jul 17];2020(Special Issue):79–104. Available from: <http://rise.hipatiapress.com><http://doi.org/10.17583/rise.2020.5925><http://dx.doi.org/10.17583/rise.2020.5925>
7. Marinoni G, Van't Land H, Jensen T. The impact of Covid-19 on higher education around the world. *IAU Global Survey Report* [Internet]. 2020 [cited 2021 Feb 16]. Available from: [https://www.iau-aiu.net/IMG/pdf/iau\\_covid19\\_and\\_he\\_survey\\_report\\_final\\_may\\_2020.pdf](https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf)
8. Cáceres-Piñaloza KF. Virtual education: Creating affective spaces for coexistence and learning in times of COVID-19. *CienciAmérica* [Internet]. 2020 [cited 2020 Jul 17];9(2):38. Available from: <http://cienciamerica.uti.edu.ec/openjournal/index.php/uti/article/view/284/424>
9. García-Peñalvo F, Correll A. The CoVid-19: enzyme of the digital transformation of teaching or the reflection of a methodological and competence crisis in higher education? The CoVid-19: the enzyme of the digital transformation of teaching or the reflection of a methodological and competence crisis in higher education? *Campus Virtuales* [Internet]. 2020 [cited 2021 Mar 3];9(2):83–98. Available from: <https://gredos.usal.es/handle/10366/144140>
10. Pérez López E, Vázquez Atochero A, Cambero Rivero S. Distance education in times of COVID-19: Analysis from the perspective of university students. *RIED Rev Iberoam Educ a Distancia* [Internet]. 2020 [cited 2021 Mar 3];24(1):331. Available from: <http://dx.doi.org/10.5944/ried.24.1.27855>
11. Hodges C, Moore S, Lockee B, Trust T, Bond A. Remote Teaching and Online Learning [Internet]. *Educause Review*. 2020 [cited 2020 Oct 24]. Available from: <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and->

12. Llorens Largo F. Recommendations for non-face-to-face teaching supported by technology [Internet]. 2020 [cited 2020 Oct 24]. Available from: [https://blogs.ua.es/faraonllorens/files/2020/03/RecommendationsDocenciaNoPreencial-CatedraTD\\_UA.pdf](https://blogs.ua.es/faraonllorens/files/2020/03/RecommendationsDocenciaNoPreencial-CatedraTD_UA.pdf)
13. Llorens F. Digital transformation versus digitalization - University, yes [Internet]. The Studia XXI blog. 2020 [cited 2020 Oct 24]. Available from: <https://www.universidadsi.es/transformacion-digital-versus-digitalizacion/>
14. Llorens F, Fernández A. Coronavirus, the litmus test of the digital university [Internet]. Studia XXI blog. 2020 [cited 2020 Oct 24]. Available from: <https://www.universidadsi.es/coronavirus-la-prueba-del-algodon-de-la-universidad-digital/>
15. Seoane Pardo AM, García Peñalvo FJ. Philosophical and Epistemological Basis for Building a Quality Online Training Methodology. In: Advances in E-Learning: Experiences and Methodologies [Internet]. IGI Global; 2008. p. 46–60. Available from: <http://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/978-1-59904-756-0.ch003>
16. Seoane Pardo AM, García Peñalvo FJ. Determining Quality for Online Activities. Methodology and Training of Online Tutors as a Challenge for Achieving the Excellence. WSEAS Trans Adv Eng Educ [Internet]. 2006 [cited 2020 Oct 24];3(9):823–30. Available from: <https://gredos.usal.es/handle/10366/123214>
17. Medina AC. Videoconferencing: conceptualization, elements and educational use. Rev EticaNet [Internet]. 2003 [cited 2020 Oct 24];2(0):1–13. Available from: <http://www.ugr.es/~sevimeco/revistaeticanet/Numero2/Articulos/La-videoconference.pdf>
18. Seoane-Pardo AM, García-Peñalvo FJ. Pedagogical Patterns and Online Teaching. In: Online Tutor 20: Methodologies and Case Studies for Successful Learning [Internet]. 2014. p. 298–316. Available from: <http://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/978-1-4666-5832-5.ch015>

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