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Comparative study between delivery modalities in higher education during emergency remote teaching due to COVID-19

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Despite the difficulties faced during Emergency Remote Teaching (ERT) because of the COVID-19 pandemic, it is also true that such a situation has left a series of learnings that educational institutions around the world should capitalize on. Under this scenario, interest arose in studying three delivery modalities (face-to-face, hybrid, and remote) at the university level, aiming to compare the students' learning level and their perceptions of each delivery modality. The present study was developed in a private university in Mexico, following a quantitative methodological approach involving 360 students and 14 professors from various schools and geographical locations. Data were collected through pre-and post-tests and a perception questionnaire for students. Findings suggest that the students' learning level in every modality varies by school and that students positively perceive the three delivery modalities, albeit identifying factors that foster and hinder their learning process in each one. The results of this study contribute to strengthening the research field on teaching during ERT, allowing educational institutions to make better decisions regarding the quality of the educational offer.

KEYWORDS

delivery modality, emergency remote teaching (ERT), higher education, comparative study, pandemic (COVID-19)

1. Introduction

The pandemic due to the COVID-19 virus outbreak challenged many educational institutions at all educational levels around the world (Singh et al., 2021). Some of these challenges were related to a decrease in teachers' wellbeing (Panadero et al., 2022a), changes in assessment practices (Panadero et al., 2022b), and the need to shift from face-to-face instructional methods to the use of virtual platforms (Fadda et al., 2021; Valsaraj et al., 2021; Rocha-Estrada and Rincon-Flores, 2022). Higher education particularly faced this latter challenge, as many professors were not prepared for teaching under the restrictions imposed by the pandemic, leading to the so-called emergency remote teaching—ERT (Hodges et al., 2020). Therefore, learning environments based on alternative delivery modalities made it possible for higher education professors to keep uninterrupted their students' learning process. Several studies have been carried out to analyze different delivery modalities in

higher education during ERT (e.g., del Arco et al., 2021a,b; Foo et al., 2021; Fretheim et al., 2021; Ramos-Pla et al., 2021, 2022; Villa Castaño et al., 2022; Wang et al., 2022; Yousry and Azab, 2022). Four main conclusions can be drawn from these studies. First, students' perceptions of ERT lessons could be explored by considering students' concerns about academic quality, teaching strategies, access limitations (Villa Castaño et al., 2022), and the professor-student interactions (del Arco et al., 2021a). Second, it could be the case that students enrolled in the remote modality perform academically worse than students enrolled in the face-to-face modality (Foo et al., 2021) or hybrid modality (Yousry and Azab, 2022). Third, shifting from face-to-face to remote teaching could harm students' wellbeing, increasing their anxiety and depression levels (Daniel, 2020; Zhao, 2020; Fretheim et al., 2021). Finally, ERT has represented an opportunity for educational innovation daring teachers to apply methodologies they had not previously experienced (Ramos-Pla et al., 2022); however, one major issue has been to transfer the face-to-face modality practices to the remote one (del Arco et al., 2021b), possibly ignoring the need for the adequate pedagogical training (Ramos-Pla et al., 2021).

Despite these valuable lessons learned, two reasons still support the need to compare different delivery modalities during ERT. First, more empirical evidence is needed on the influence of these different delivery modalities on both students' learning level and emotions, so that better preparation can be set in case of returning to a similar situation in the future. Second, identifying what elements of each delivery modality contribute the most to students' learning experience could help to shape the future of higher education teaching practices, something eminent worthwhile.

Considering all the above, the objectives of the present study are twofold. The first objective is to determine the learning level of students enrolled in the face-to-face, hybrid, and remote modalities at the university level. The second objective is to identify students' perceptions of each of the three delivery modalities mentioned earlier. Consequently, the following research questions are posed in the present study:

> RQ1. What is the learning level of university students enrolled in the face-to-face, hybrid, and remote delivery modalities during ERT?

> RQ2. How do university students perceive the face-to-face, hybrid, and remote delivery modalities during ERT?

2. Method

The present study was carried out during the academic semester of February to July of 2022 at the Tecnológico de Monterrey, a non-profit, private Mexican university that attends a population of approximately 60,000 undergraduate students and encompasses a faculty of almost 11, 000 professors on 26 campuses nationwide. The methodological approach was quantitative (Johnson and Christensen, 2008) and comprised two stages. In stage one, a course from each of the university's schools was selected for further analysis if the course met the following criteria: (1) it was taught in at least two out of the three different delivery modalities; and (2) professor's profile was very similar across the different delivery modalities (i.e., same gender, and similar age and working experience at the institution). Next, students enrolled in each delivery modality sat a multiple-choice question (MCQ) at the beginning (pre-test) and the end of the course (post-test). Students' learning level was calculated as the post-test score. In stage two, students answered a structured questionnaire to identify their perceptions of the delivery modalities. The designing process of these instruments is explained in detail in Section "2.3. Instruments."

2.1. Participants

The sample included 360 students who were enrolled in the face-to-face (n = 131, 36.4%), hybrid (n = 62, 17.2%), and remote (n = 167, 46.4%) modalities belonging to the following schools within the institution: Architecture, Art, and Design (n = 69, 19.2%), Social Sciences and Government (n = 58, 16.1%), Humanities and education (n = 27, 7.5%), Engineering and Sciences (n = 64, 17.8%), Medicine and Health Sciences (n = 48, 13.3%), and Business (n = 94, 26.1%). Most of the students were attending their first semester (n = 145, 40.3%), and second semester (n = 204, 56.7%), with a low percentage of students being enrolled in the third semester or above (n = 11, 3%). In terms of gender distribution, 170 (47.2%) of the students were female. The average age of the students was 19.72 years (S.D. = 0.97) and most of them graduated from the Tecnológico de Monterrey's high school system (n = 194, 54%). The students came from campuses all over Mexico, namely, Monterrey (105), Queretaro (74), Estado de Mexico (48), Ciudad de Mexico (43), Ciudad Juarez (30), Santa Fe (30), Zacatecas (7), Puebla (6), Toluca (5), Guadalajara (4), Aguascalientes (3), Chiapas (1), Chihuahua (1), Leon (1), Sinaloa (1), and Sonora Norte (1).

The sample also included 14 professors whose academic background was doctoral degree (n = 2, 14%) and master's degree (n = 12, 86%), being part of one of the following schools: Architecture, Art, and Design (n = 3, 21%), Social Sciences and Government (n = 3, 21%), Humanities and Education (n = 1, 7%), Engineering and Sciences (n = 3, 21%), Medicine and Health Sciences (n = 2, 14%), and Business (n = 2, 14%). In terms of gender distribution, 9 (64%) of the professors were female. The mean age of the professors was 49.08 years (S.D. = 7.83) and their mean academic experience within the institution was 20.8 semesters (S.D. = 11.62).

2.2. Definition of delivery modalities

The three delivery modalities compared in this study are described below. Undoubtedly, the contents of each course changed depending on the school, but professors participating in the study received the same guidelines from the institution to design their courses in each of the modalities.

The face-to-face modality consists of the students and the professor sharing the same physical classroom (Lorenzo-Lledó et al., 2021; Verde and Valero, 2021). The professor uses several resources such as videos, presentations, and readings, also

enhancing students' experience through active learning. Learning assessment is based on face-to-face feedback through informal questions, formal exams, and group assignments.

The hybrid modality is a face-to-face course with simultaneous attention to two groups of students via web conference, one in-person and the other remote. Supervised activities and collaborative work are privileged also relying on digital resources for active learning. Learning assessment occurs multimodally: video, audio, and written feedback (Bao, 2020; EDTEC, 2023).

The remote modality is a 100% remote course taught through web conferences synchronously (Verde and Valero, 2021). The students are flexible to attend class sessions from any geographical point, but they can also interact with their professors and classmates. This modality entails a digital environment that integrates resources and activities to enrich learning allowing personalized monitoring by the professor. Learning assessment is based on digital assessment resources (Chhetri, 2020; EDTEC, 2023).

2.3. Instruments

2.3.1. MCQ test

An MCQ test per school was designed to measure students' learning level by following the steps described next. Firstly, professors attended a 4-h workshop aiming at writing four-choice items with one correct answer. The general objectives of this workshop were to identify the concepts of assessment construct (López, 2014) and specification matrix (Kubiszyn and Borich, 2003); and to elaborate MCQs. Consequently, during the training, the attendants had the opportunity to define the specification matrix of their MCQ test (including key elements such as the assessment construct and the learning objectives of the test) and a preliminary draft of the items. Secondly, the professors worked independently to finish the first version of the items. Thirdly, and due to the impossibility of conducting a quantitative validation of the items, two stages of qualitative validation were performed considering the 31 criteria proposed by Haladyna et al. (2002). Such a qualitative validation process made it possible to revise the items according to their content, format, stem, and answer options, and to classify them as "high," "middle," or "low" quality items. Therefore, professors were advised to adjust the structure of the "high" and "middle" items when needed, while "low" quality items were discarded. Thirdly, the 16 items which exhibit the best quality were included in the final version of the MCQ test, which was scored from 0 to 100. The number of items was set to 16 because of the need of having an MCQ test that could be answered in a short time (30 min or less). Moreover, this number of items was appropriate to assess the number of learning objectives defined in the specification matrix (three to four by school). Finally, the last version of each 16-item MCQ test was uploaded to Canvas by the participant professors.

2.3.2. Perception questionnaire

The students' perception questionnaire was developed following the steps to create surveys in educational research suggested by Artino et al. (2014). First, a literature search was conducted to identify instruments existing in similar studies published during ERT. Given that a systematic literature review was beyond the scope of the present study, the conducted search aimed at merely determining the main characteristics of the instruments included in already published papers. Therefore, information on structure, categories of the questions, number of items, and scales were retrieved from several published articles during ERT (Bączek et al., 2021; Chandran et al., 2021; Quispe-Prieto et al., 2021; Verde and Valero, 2021; Zhou and Zhang, 2021). Second, a focus group was carried out with seven students with similar characteristics to the students invited to this research. The main purpose of this focus group was to determine which elements the students considered could define the perceptions of their learning experience during ERT. This focus group was completely virtual (via Zoom) and lasted 90 min. Third, information obtained from both the literature review and focus group was then synthesized and several categories emerged from this process, namely, general information, positive emotions, negative emotions, learning community (Griffin et al., 2003), social relationships (Walker and Baepler, 2017), learning process, and teaching process. These categories were then chosen as the sub-scales of the questionnaire. Fourth, a preliminary version of the questions was developed for each sub-scale. Fifth, the completed version of the questionnaire was validated by two experts from the institution. They were asked to revise the instrument regarding representativeness, clarity, relevance, and distribution (Artino et al., 2014). Grammar mistakes such as typos were corrected after their revision, and one question was added to the social relationships sub-scale. Two open-ended questions asking students what aspects favored and hindered their learning were also added to the questionnaire. Sixth, the final version of the questionnaire was created in Qualtrics. Except for the general information category, items within the rest of the sub-scales included sliders with a continuous scale ranging from 0 to 100. Each sub-scale showed high reliability as indicated by Cronbach's alpha values ranging from 0.86 to 0.94. Similarly, fit indexes (TLI, CFI, RMSEA, SRMR) resulting from the Confirmatory Factor Analysis suggested a satisfactory construct validity for each sub-scale according to the evaluation thresholds summarized by Boateng et al. (2018). **Supplementary material** includes the final version of the perception questionnaire as well as the results from both reliability and construct validity analyses.

2.4. Data analysis

Several analyses were followed to answer the research questions posed in this study. Regarding research question number one, analyses of covariance (ANCOVAs) were conducted to identify statistically significant differences in students' post-test scores between delivery modalities when controlling for students' gender and pre-test scores. Regarding research question number two, analyses of variance (ANOVAs) were performed to determine statistically significant differences in students' perceptions of the delivery modalities. Next, students' answers to open-ended questions were coded and categorized to identify the perceived factors that foster and hinder their learning process in every delivery modality.

3. Results

3.1. What is the learning level of university students enrolled in the face-to-face, hybrid, and remote delivery modalities during ERT?

Table 1 summarizes the descriptive statistics of students' learning level as well as the ANCOVAs results for comparing these levels between the delivery modalities. The respective assumptions of each ANCOVA model (i.e., the model per school) were checked to ensure the quality of the results by following the recommendations of Laerd Statistics (2018). There was homogeneity of regression slopes, as determined by a comparison between the two-way ANCOVA model with and without interaction terms (i.e., the interaction term was not significant). There was also homogeneity of variance, as assessed by Levene's test ($p > 0.05$) and White's test ($p > 0.05$). Studentized residuals were approximately normally distributed, as indicated by Shapiro-Wilk's test ($p > 0.05$).

The ANCOVAs results indicated that students' learning level was significantly different [$F(1,64) = 19.766$, $p < 0.001$] in the school of Architecture, Art, and Design, with higher levels of learning in the face-to-face modality ($M = 84.94$, S.E. = 2.07) than in the remote modality ($M = 70.71$, S.E. = 2.42). In addition, statistically significant differences were also found in the School of Medicine and Health Sciences [$F(1,43) = 11.109$, $p = 0.002$] in favor of the remote modality ($M = 87.96$, S.E. = 3.44) when compared to the face-to-face modality ($M = 70.21$, S.E. = 3.86). Finally, statistically significant differences were identified in the School of Businesses [$F(2,87) = 28.741$, $p < 0.001$]. A Bonferroni *post-hoc* test ($p < 0.001$) revealed that students' learning level in the remote modality ($M = 75.38$, S.E. = 1.41) was lower than in the face-to-face ($M = 90.62$, S.E. = 1.68) and hybrid ($M = 87.71$, S.E. = 1.55) modalities.

3.2. How do university students perceive the face-to-face, hybrid, and remote delivery modalities during ERT?

Table 2 displays the descriptive statistics of students' perceptions as well as the results of ANOVAs to compare these perceptions between the delivery modalities. Notice that Welch's ANOVA was preferred when the data did not fulfill the homogeneity of variance assumption (Moder, 2010). First, statistically significant differences were found between delivery modalities in the category of social relationships [$F(2,92.789) = 5.499$, $p = 0.006$]. A Games-Howell *post-hoc* test ($p = 0.004$) revealed that students perceived their social interactions to be higher in the face-to-face modality ($M = 82.61$, SD = 22.36) than in the remote modality ($M = 71.1$, SD = 27.41). Second, statistically significant differences were also found across delivery modalities in the category of learning process [$F(2,101.564) = 4.529$, $p = 0.013$]. A Games-Howell *post-hoc* test indicated that students' learning process was worse perceived in the remote modality ($M = 73.5$, $SD = 25.9$) than in the hybrid ($M = 82.62$, SD = 16.62, $p = 0.048$), and face-to-face modalities ($M = 82.49$, $SD = 19.28$, $p = 0.017$).

TABLE 1 Students' learning level in the face-to-face, hybrid, and remote modalities.

School	Delivery modality	*N*	Post-test mean[1]	Standard error	Difference[2]
Architecture, art, and design	Face-to-face	41	84.94	2.07	F–R = 14.23*
	Remote	28	70.71	2.42	
Social sciences and government	Face-to-face	14	85.41	3.44	F–H = 0.03
	Hybrid	20	85.38	2.57	F–R = 8.44
	Remote	24	76.97	2.55	H–R = 8.41
Humanities and education	Face-to-face	14	81.64	2.32	F–R = 3.13
	Remote	13	78.51	2.39	
Engineering and sciences	Face-to-face	16	73.75	3.08	F–H = 5.91
	Hybrid	12	67.84	5.56	F–R = −1.26
	Remote	36	75.01	1.98	H–R = −7.17
Medicine and health sciences	Face-to-face	20	70.21	3.86	F–R = −17.75*
	Remote	28	87.96	3.44	
Business	Face-to-face	26	90.62	1.68	F–H = 2.92
	Hybrid	30	87.71	1.55	F–R = 15.25*
	Remote	38	75.38	1.41	H–R = 12.33*

[1] Adjusted means of post-test controlling for students' gender and pre-test scores.
[2] F, H, and R indicate, respectively, the face-to-face, hybrid, and remote modalities.
*Statistically significant differences after the Bonferroni adjustment for multiple comparisons.

TABLE 2 Comparison of students' perceptions of delivery modalities.

Category	Delivery modality	*N*	Mean (SD)	Difference[1]
Positive emotions	Face-to-face	81	82.45 (16.61)	F–H = 3.74
	Hybrid	33	78.71 (20.51)	F–R = 5.87
	Remote	112	76.58 (23.69)	H–R = 2.13
Negative emotions	Face-to-face	81	37.25 (27.08)	F–H = 3.79
	Hybrid	33	33.46 (27.72)	F–R = 6.11
	Remote	112	31.14 (26.01)	H–R = 2.32
Learning community	Face-to-face	81	87.12 (16.63)	F–H = 5.99
	Hybrid	33	81.13 (23.83)	F–R = 5.28
	Remote	112	81.84 (21.94)	H–R = −0.71
Social relations	Face-to-face	81	82.61 (22.36)	F–H = 1.69
	Hybrid	33	80.92 (22.58)	F–R = 11.51*
	Remote	112	71.1 (27.41)	H–R = 9.82
Learning process	Face-to-face	81	82.49 (19.28)	F–H = −0.13
	Hybrid	33	82.62 (16.62)	F–R = 8.99*
	Remote	112	73.5 (25.9)	H–R = 9.12*
Teaching process	Face-to-face	81	92.21 (11.33)	F–H = 0.59
	Hybrid	33	91.62 (9.5)	F–R = 4.62
	Remote	112	87.59 (17.74)	H–R = 4.03

[1]F, H, and R indicate, respectively, the face-to-face, hybrid, and remote modalities.
*Statistically significant differences after the Games-Howell test for multiple comparisons.

Students were finally asked about factors that foster and hinder their learning process according to the delivery modality, being these responses coded and categorized in **Figures 1**, **2**, respectively. Notice that the number of analyzed codes is given in brackets in both figures. On the one hand, students enrolled in the face-to-face modality (**Figure 1A**) considered that more social interaction with peers and professor (34%), paying more attention in class (15%), and better communication with peers and professor (11%) were the three factors that most favored their learning. Regarding the hybrid modality (**Figure 1B**), students reported that the modality flexibility (31%), the class session recordings' availability (24%), and the material provided by the professor (17%) were the aspects that most contributed to their learning. Finally, students enrolled in the remote modality (**Figure 1C**) identified the class session recordings' availability (24%), the material provided by the professor (16%), and flexible location for attending class sessions (14%) as the most favorable aspects for their learning.

On the other hand, the most frequent response regarding factors hindering students' learning was "none" in the three modalities, being more frequent in the hybrid modality (46%) than in the face-to-face (23%), and remote (18%) modalities. Nevertheless, students enrolled in the face-to-face modality (**Figure 2A**) also reported that going to campus (11%), class session schedule (10%), and re-adapting to the face-to-face modality (10%) were obstacles to their learning. Students enrolled in the hybrid modality (**Figure 2B**) perceived that no interaction with peers (12%), the course contents (8%), and internet connection issues (8%) were hindrances to their learning. Finally, for the remote modality (**Figure 2C**), the perceived factors that most prevented learning reported by the students were lack of attention in class (18%), no interaction with peers (15%), and no interaction with the professor (13%).

4. Discussion

The objectives of the present study were twofold. The first objective was to determine the learning level of university students enrolled in three delivery modalities, namely, face-to-face, hybrid, and remote. The second objective was to identify students' perceptions of each of these delivery modalities mentioned earlier.

Regarding the first research question posed in this study, there were statistically significant differences in students' learning levels in three of the six investigated schools. Larger significant differences were found in favor of face-to-face modality in the schools of Architecture, Art, and Design, and Business, while students' learning in remote modality was significantly higher in the School of Medicine. A possible explanation of the better results of the face-to-face modality could be that students perceived more social interaction with their professors and peers in this modality, as well as they reported paying more attention to class sessions. These results are aligned to those reported by Ramos-Pla et al. (2022) who found that a good practice during ERT was using collaborative learning for promoting active interactions between faculty and students. Furthermore, Lorenzo-Lledó et al. (2021) reported that 64.9% of students prefer face-to-face teaching

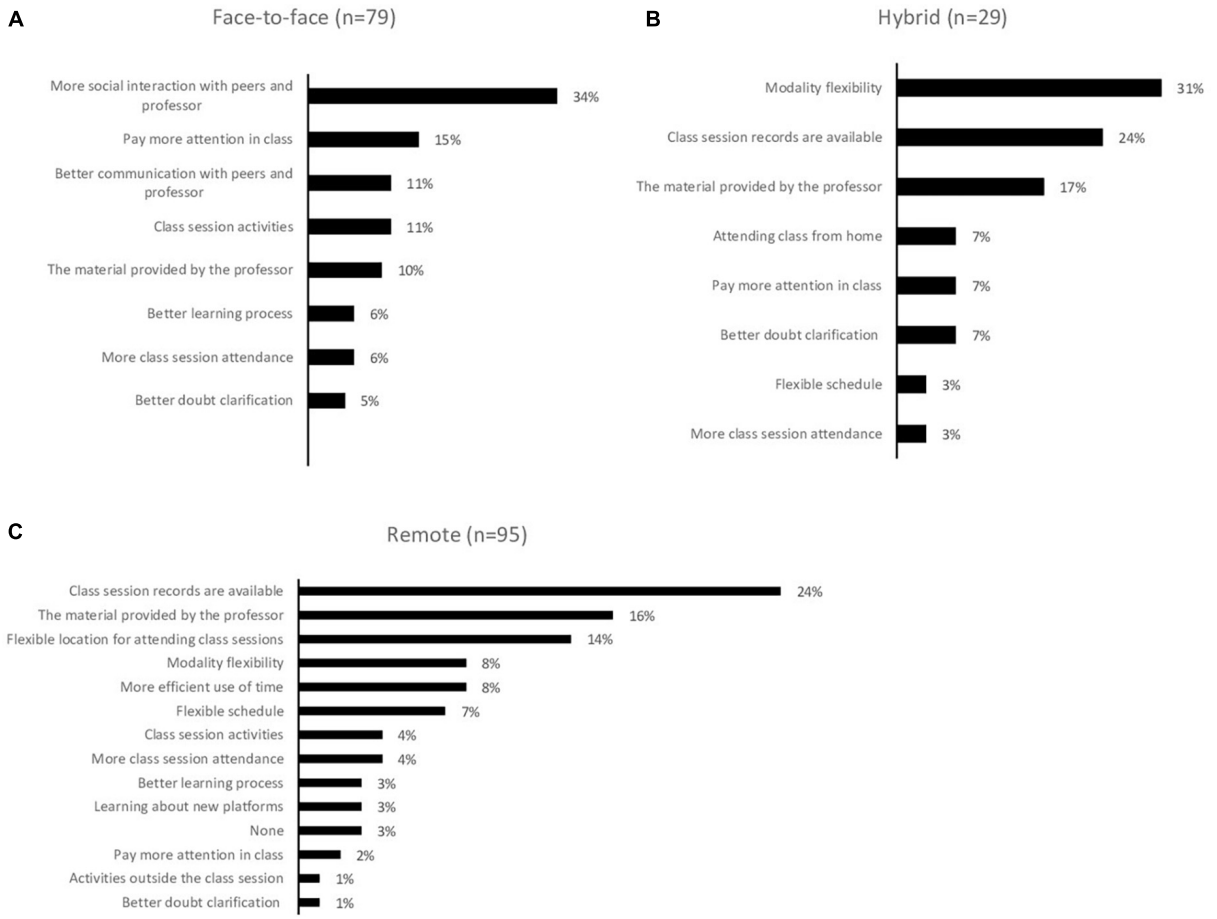

FIGURE 1
Perceived factors fostering learning in each modality: face-to-face **(A)**, hybrid **(B)**, and remote **(C)**.

compared to 23.7% who prefer hybrid teaching, while the quality of the remote modality was perceived as low by university students (del Arco et al., 2021b). The differences in favor of the remote modality could be explained by the availability of the class session records and the students' positive perceptions of online material. These results are similar to the studies of Chhetri (2020), Potaliya and Ghatak (2020), and Delgado et al. (2021) who found that Medicine students preferred to watch several times the recorded classes for studying theoretical topics but attending face-to-face sessions for their practical subjects. Furthermore, remote classes have been reported to be the best way for continuous learning in ERT situations, as they promote engagement when students are autonomous, there are specific purposes in the activities, and there is interaction between professors and students (Binks et al., 2021; Yu-Fong Chang et al., 2021). Notice, however, that there is no evidence to conclude that students learn more in a specific delivery modality, even though the learning experience is perceived differently. Therefore, further research is needed to grasp a better understanding of the influence of different teaching practices on students' learning process. In this regard, it is mandatory to understand the differences between ERT and online learning (Hodges et al., 2020), so institutions, professors, and students keep taking advantage of the latter widely accepted educational approach.

Regarding the second research question posed in this study, it could be argued that students favorably perceive the three analyzed modalities, as they more frequently reported that no factor hindered their learning process in all of them. Moreover, there were no statistically significant differences in students' perceptions in the categories of positive emotions, negative emotions, learning community, and teaching process. However, there were statistically significant differences in the categories of social relations and learning process in favor of the face-to-face modality. While it is true that peer interaction is an important factor for learning, so is the need to develop real-world practices (Yu-Fong Chang et al., 2021) that undoubtedly contribute to the development of competencies. This fact could represent a key advantage of the face-to-face modality, considering that students also reported perceiving better communication with the professor and peers in this delivery modality.

Two limitations of the present study should be acknowledged. To begin with, it was not possible to include a hybrid course in three of the six investigated schools. Therefore, it would be of great value to replicate the study, ensuring that the same course is being taught under the three delivery modalities, leading to a more meaningful comparison. Additionally, although the participating professors received the same indications

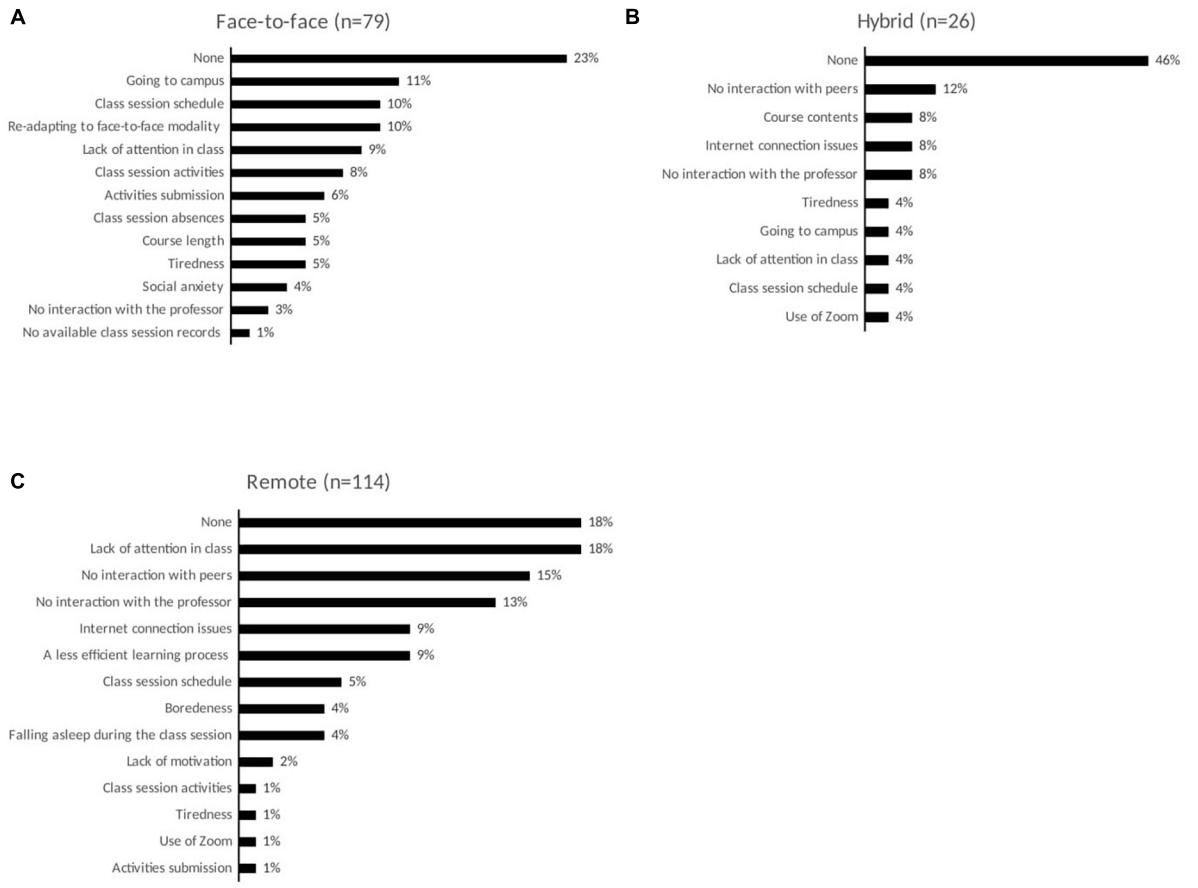

FIGURE 2
Perceived factors hindering learning in each modality: face-to-face **(A)**, hybrid **(B)**, and remote **(C)**.

from the institution regarding the design of their courses, it was not possible to control for their previous training on this matter, being a variable that could have impacted their students' learning level.

5. Implications and future research

Despite the puzzling comparison between the three delivery modalities, the findings of the present study have implications for future practice and education which are discussed next at the course, school, and policy levels.

At the course level, future research on delivery modalities could focus on the design of an enriched hybrid model. In this sense, the best elements of the face-to-face modality could be combined with the best elements of the remote modality. For example, this enhanced hybrid model should benefit from face-to-face social interaction and combine it with the flexibility and versatility of the remote mode. However, the design process of any future delivery modality should not be conceived as an isolated responsibility of the professors; on the contrary, it should imply the active participation of professors, students, and instructional designers. An additional key aspect to explore would be the optimal percentage of occurrence of the two modalities to be combined, that is, what percentage of the course should be face-to-face and what percentage should be remote. The interest is not to propose a prescriptive designing process but rather to promote the learning experience of the students. In this respect, face-to-face activities within a hybrid modality can be enriched with the use of technological tools such as augmented reality, virtual reality, and adaptive learning platforms, among others. In addition, it is also recommended to continue exploring alternative ways to assess student learning in case of any future contingency situation. Next teaching modalities must ensure that the feedback provided by the professors occurs in both an effective and timely manner so that students can identify the status of their learning process and what they should do to progress in their academic journey.

At the school level, the present study suggests that the relationship between the learning level and the type of modality might be influenced by the type of school, as well as the inherent needs of each course. Therefore, it is recommended that each school carefully revises whether the offered courses are theoretical or practical based, and the semester in which students enroll in them. For example, it could be the case that the face-to-face modality works better for theoretical contents in the first year, but the hybrid one offers better results for similar courses at the end of the students' university studies. Ultimately, the main objective should be to diversify the educational offer making it more

responsive to the professors' and students' needs. Furthermore, it seems worth increasing efforts within each school to train the professors in at least two aspects. The first one is how to use technological tools from an educational perspective, and not from a merely instrumental one, aiming at promoting professor-student interaction as well as collaborative workspaces among students. The second one is the pedagogical knowledge that requires teaching a course from a modality different than the face-to-face modality. In this respect, several curricular concerns such as what to teach, how to teach it, and how to assess it should be covered. Undoubtedly, this type of training requires the commitment of the school authorities so that professors have access granted to the demanded resources for successful training.

At the policy level, it is necessary to recognize that the teaching modalities analyzed in this study would influence the level of students' learning, the development of their skills, and their future insertion into the labor market. Therefore, more, and better-focused efforts should be made to evaluate the impact of these delivery modalities to identify what elements work well and which ones need to be improved within each modality.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

CR-H and ER-F contributed to the conception and design of the study. CR-H performed the statistical analysis. ER-F conducted the literature review. Both authors wrote sections of the manuscript and contributed to reading, revising, and approving the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2023.1179330/full#supplementary-material

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