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Comparing teaching actions in face-to-face and synchronous online settings using an observation protocol for K-12 education

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ABSTRACT

Synchronous online education became crucial during the COVID-19 pandemic. However, more research needs to be done on how to observe the quality of synchronous online teaching in K-12. This research seeks to address this gap by comparing the activities that teachers engage in during synchronous online classes with those used in face-to-face scenarios to adapt a face-to-face observation protocol to be used in both situations. Quantitative and qualitative techniques were used to compare classroom observations of teachers performing similar lessons in the two scenarios. Results show that teachers working online engaged in more actions associated with classroom management but fewer related to promoting cooperation, assessment, and offering feedback to their students. The qualitative results complement these findings, showing that evaluating the quality of teaching in synchronous online teaching settings requires additional indicators tailored to its unique characteristics. Based on this, we propose a set of indicators to observe online synchronous teaching quality. These findings can inform in-service teachers, professional development courses, and further research efforts.

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1. Introduction

The emergence of digital teaching during the COVID pandemic was not solely a response to the immediate crisis; it is crucial to acknowledge that the increasing availability and accessibility of technologies played a pivotal role in enabling the adoption of digital teaching methods (Pedaste et al., 2020). In this context, many studies have described teacher's practices, challenges, and conditions during this period (e.g. An et al., 2021; Keese et al., 2022; Tawfik et al., 2021, among others), and others have looked at the transition from face-to-face to online teaching in higher education (Daumiller et al., 2021; Law et al., 2023; Rajaraman et al., 2024; Svihus, 2024). However, few studies have focused on the quality of the synchronous online teaching activities implemented during the COVID lockdown period, particularly in K-12.

There is a scarcity of observation instruments/protocols for online synchronous teaching activities in K-12, as opposed to face-to-face contexts (for example, see the review of Anwar & Menekse, 2021). Given this, one possible approach to fill this gap is to adapt a regular classroom observation protocol to an online synchronous context. Specifically, employing a face-to-face observation protocol in both settings and compare the results to refine and complement the observed indicators and activities.

In this context, the goals of this study are to compare the quality of teaching actions in face-to-face and online synchronous education using a structured class observation instrument (Chun et al., 2023; van de Grift, 2014), to identify and define a set of indicators to observe teaching quality in synchronous online contexts and to propose an instrument that can be used in both scenarios. The purpose is to contribute to the discussion about the quality of teaching in synchronous online classes in schools.

2. Literature review

2.1. Synchronous online education

Synchronous online education is a distance education method in which participants in the teaching and learning process meet virtually in a shared space in real-time (Phelps & Vlachopoulos, 2020). Technology allows 'face-to-face' contact between students and teachers, but the level of interaction depends on thoughtful planning of the available communication channels (Lawson et al., 2010). Therefore, teachers need to understand the context in which these interactions occur and the tools available to decrease the transactional distance (Moore, 1993), that is, to reduce the comprehension and communication gap caused by geographic distance among the participants (O'Brien & Fuller, 2018).

One of the most important aspects of online classes lies in getting students' motivation, and keeping them actively engaged in learning (Kurt et al., 2022), which includes socio-affective, behavioural, and cognitive aspects (Baeza & Hinostroza, 2025; Tawfik et al., 2021). Borup et al. (2014) emphasizes enhancing student engagement through interactions with their peers, instructors, parents and guardians. In this regard, the framework defined as *Community of Inquiry* (Garrison et al., 2010) is one of the most frequently used in research on online learning (Carroll et al., 2025; Caskurlu, 2018; Martin et al., 2022; Richardson et al., 2017). This framework defines three types of *presences*: cognitive, social, and teaching, which interact to improve learning in online education contexts. Studies suggest the importance of the 'teaching presence' for student achievement of learning goals (Gurley, 2018), defined as 'the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes' (Anderson et al., 2001, p. 5). Expanding on this, Lo and Hew (2022) emphasize the importance of a fourth type called 'learner presence', which highlights students' self-regulation and emotional engagement as critical elements for sustaining engagement and success in online environments.

A strong teaching presence is essential for fostering positive teacher–student relationships and bridging both the actual and perceived distances inherent in videoconference-based learning (Rehn et al., 2016) as it contributes to a shared sense of presence and co-participation (Gurley, 2018). To achieve this, teachers must ensure active communication (Greenhow et al., 2021), provide feedback, encourage interaction among students, and coordinate the use of technology during their classes at a higher level than they do in traditional classes (Kangwa et al., 2024; O'Brien & Fuller, 2018).

Despite the growing recognition of technology's transformative potential in education, teaching and learning in online environments often reveal inherent challenges. These include inequities in access to

technology, difficulties to foster collaboration among peers, and the need for new pedagogical approaches (OECD, 2020; Reimers, 2024). These differences underscore the need of systematically examine teaching practices across both modalities to understand their impact on student learning outcomes and engagement. Comparative studies are particularly important for identifying transferable practices that can enhance teaching quality regardless of the learning context (Archambault et al., 2022; Darling-Hammond et al., 2020). Research also indicates that the rapid adoption of synchronous online teaching during the pandemic exposed gaps in teacher training and technological readiness. For instance, educators often reverted to traditional content-delivery methods, neglecting interactive or collaborative learning strategies that are more common in face-to-face settings (OECD, 2020).

2.2. Teaching quality frameworks and standards

Many studies have described and characterized the teaching practices that correlate with student achievement (Stronge et al., 2011). Some studies (Bell et al., 2019; Noben et al., 2022), identified K-12 teaching practices related to efficient classroom management, creation of a safe and stimulating learning environment, development of clear and activating instruction, teaching-learning strategies and promotion student engagement as relevant dimensions to assess teaching quality.

However, when evaluating effective synchronous online teaching, the available evidence in K-12 is scant since most studies focus on higher education (Albrahim, 2020; Martin et al., 2020; Thomas & Graham, 2019). The approaches used to define good quality teaching practices in synchronous online K-12 contexts can be classified into three groups, which will be described below.

Regarding the first group, *definitions of online teaching standards*, Pulham and Graham (2018) identified seven dimensions associated with online and blended teaching practice quality: pedagogy, management, assessment, technology, instructional design, dispositions, and improvement. The National Standards for Quality Online Teaching (NSQ, 2025) and the Standards for K-12 Online Learning in British Columbia (2021) provide additional suggestions to evaluate and improve online teaching, focusing on professional responsibilities, digital pedagogy, community building, learner engagement, assessment, and instructional design.

In the second group, *empirical evidence of good online teaching practices*, Darling-Hammond et al. (2020) and Danielson (2020) suggest good practices for quality remote teaching, such as connecting activities to students' context and interests and using interactive tools. Rehn et al. (2018) identify specific skills teachers require for videoconferencing, including pedagogical, management, social, and technical skills. Krutka et al. (2019) emphasize the importance of presenting expectations and establishing class rules in synchronous online classes and Prestridge et al. (2025) found that online teachers were focused on how to understand and work with the content, on helping learners to engage actively, and on developing teacher-to-student and student-to-student relationships. Additionally, O'Brien and Fuller (2018) mention various strategies teachers employ in synchronous online classes, such as surveys, blackboards, emoticons, and group sessions.

Finally, in the third group, *online teaching frameworks*, Archambault et al. (2022) propose five key pillars for effective online pedagogy: building relationships and community, incorporating active learning, leveraging learner agency, embracing mastery learning and ongoing feedback, and personalizing the learning process. Borup et al. (2014) suggest organizing lessons into short segments, involving parents and guardians in monitoring student progress, and promoting peer learning.

Although the approaches within the three groups share the common goal of defining high-quality teaching practices in synchronous online K-12 settings, they differ in both scope and depth. Approaches in the first group address the full spectrum of teaching activities—such as planning, instruction, and resource development. In contrast, the second group focuses on specific teacher behaviours and/or competencies required for effective online teaching, while the third group is grounded in theoretical frameworks that define quality in online instruction. All three include, to varying degrees, descriptions of observable teacher actions during synchronous online lessons. Accordingly, in the present study, we drew on elements from each group to inform and enrich the development of our teaching quality observation protocol.

Specifically, considering these approaches, the present study focused on five dimensions, which included classroom management inspired by perspectives that emphasize pedagogy, management, assessment, and instructional design in online teaching (Pulham & Graham, 2018; Rehn et al., 2018); the relevance of having a safe and stimulating learning environment (Archambault et al., 2022); the provision of clear instructions for setting clear expectations and class rules (Krutka et al., 2019); the adoption of learning strategies, such as connecting activities to students' context and using interactive tools (Baeza & Hinostroza, 2025; Danielson, 2020; Darling-Hammond et al., 2020; O'Brien & Fuller, 2018); and the effort to gain students engagement while connecting the topics with their interests (NSQ, 2025).

While existing studies offer valuable recommendations and articulate foundational principles for effective online teaching, the lack of a structured observational framework to translate these criteria into observable behaviours and instructional actions remains a critical limitation. This gap hinders the comprehensive assessment and systematic improvement of synchronous online teaching practices. To address this, it is essential for educational stakeholders to collaborate in the development of a standardized observational protocol that is both evidence-based and aligned with professional standards—promoting accountability while also supporting the ongoing development of online educators. The literature review underscores a clear absence of validated instruments designed to observe, evaluate, and compare the quality of synchronous online instruction in K–12 education. Therefore, this study aims to answer the following research questions:

- RQ1: What are the similarities and differences in the quality of teaching actions between face-to-face and online synchronous teaching in K-12 settings?
- RQ2: Which teaching actions should be included in an observation protocol applicable to both contexts?

3. Method

3.1. Research design

The present study was based on a quasi-experimental design with an observational approach using mixed methods (Johnson et al., 2007; Johnson & Christensen, 2019). Data was collected through an observational protocol applied to teachers in face-to-face and online classes, which provides both quantitative and qualitative information to compare teaching actions in these two modalities.

3.2. Participants

Observations were conducted with teachers who taught Language and Literature to seventh-grade students in Chilean schools. In the face-to-face modality, three teachers from three schools located in the Araucanía Region participated. A different group of teachers participated in the online modality, these were six teachers from six schools located in four regions: Metropolitan, Araucanía, Los Ríos, and Los Lagos. In total, 56 face-to-face and 47 online classes were observed, which constituted the data to compare teaching actions in the two modalities.

3.3. Intervention

An intervention was structured to standardize the topics and classroom activities, ensuring that the dimensions of the observational instrument applied could be consistently measured among the participants. The intervention consisted of implementing four teaching and learning activities developed by the researchers using a method for teaching Language and Literature described in Hinostroza et al. (2025) (see Figure 1).

Teachers from the face-to-face group conducted activities designed to address learning objectives based on the target method. A teaching guide was developed for each activity with step-by-step instructions. Workbooks were provided for the students, and the researchers suggested pedagogical resources that the teachers might use in class.

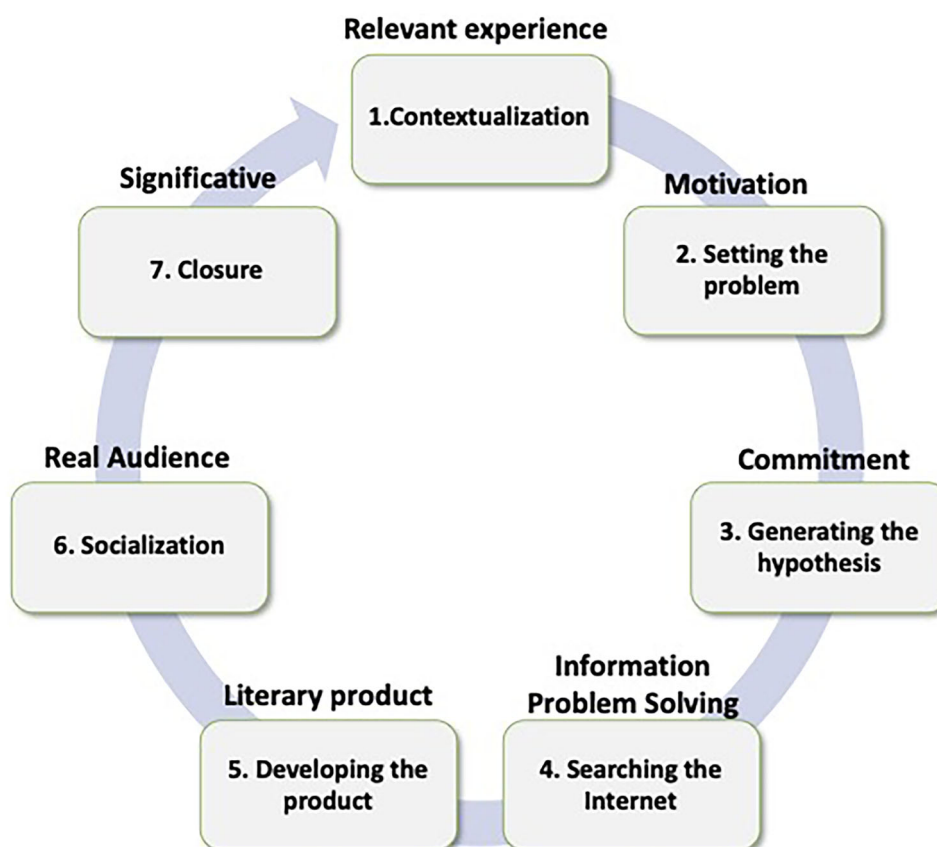


Figure 1. Stages of the method for teaching Language and Literature.

Source: Hinostrroza et al. (2025).

The online teaching group implemented the same sequence of activities, which the research team adapted to the Google Classroom virtual platform. The researchers adjusted these activities to align with the duration of the synchronous online classes defined by the Ministry of Education during the pandemic (i.e. 45 minutes). The activities were structured around the seven original stages of the model (Figure 1), respecting each one's goal while maintaining the theoretical assumptions of the design. Each activity was presented by a research team member and discussed with the teachers before being applied.

Strategies were developed for each activity to support the different stages of the model. For example, discussions were held (Stages 1, 2, 6, and 7), and digital resources (forms, spreadsheets, and screencasts) were used to support the presentation of the hypotheses (Stage 3), information searches (Stage 4), and the development of the product (Stage 5).

Figure showing a cyclical model illustrating seven sequential stages of a learning process. Arranged clockwise, the stages are: (1) Contextualization, representing relevant experience; (2) Setting the problem, reflecting motivation; (3) Generating the hypothesis, showing commitment; (4) Searching the Internet, indicating information problem solving; (5) Developing the product, corresponding to a literary product; (6) Socialization, referring to interaction with a real audience; and (7) Closure, signifying meaningful reflection. The circular arrow connecting all stages indicates that the process is iterative and continuous (generated by AI and edited).

3.4. Instruments

A structured class observation protocol and field notes associated with the dimensions and indicators observed were used to evaluate the teaching activities (Johnson & Christensen, 2019). The instrument was an adaptation of the 'International Comparative Analysis of Learning and Teaching (ICALT)' observation framework (van de Grift, 2014). This is a general observation system with a strong focus on

teachers' actions, validated in different countries (Bell et al., 2019; Maulana et al., 2021), that 'can provide meaningful information about effective teaching behaviour of specific individual lessons' (Maulana et al., 2025, p. 361). The adaptation consisted of translating into Spanish the indicators most used across the different applications of the protocol. The instrument covers five dimensions of teaching quality and 22 indicators that correspond to teacher behaviours that are considered effective (Table 1).

The observation protocol was used to collect data in each class. Each dimension (e.g. 'classroom management') comprises multiple indicators, each reflecting a specific, observable teacher behaviour expected during the lesson (e.g. 'uses time for learning efficiently'). For each indicator, the protocol provides concrete examples of teacher actions to guide observers in their evaluations. In the case of the protocol used for the online group, these examples were adapted or complemented with synchronous online teaching actions described in the literature (for example, for the indicator 'Promotes cooperation among students' the example 'the teacher organises activities for the students to work in groups' was complemented with 'the teacher organises activities for the students to work in virtual rooms'). During each lesson, observers recorded the presence or absence of these actions and supplemented their observations with detailed field notes, as emphasised by Maulana et al. (2025). After the lesson, they assessed the level of performance for each indicator using a four-point Likert-like scale: 1 indicated that the expected behaviour was not observed; 2, that it was observed in only a few of the associated actions (little progress); 3, that several of the actions were observed (partial progress); and 4, that all associated actions were observed (fully achieved). Finally, the scores were categorised as insufficient (scores of 1 or 2), sufficient (score of 3), or good (score of 4).

To validate the observation instrument, researchers observed three teachers' classes before the intervention and analysed the differences in the scores assigned to each indicator. If the score difference was one point, they established criteria for assessing the teachers' behaviours. For differences between two or more points, they discussed the sample activities in the observation guidelines, compared them with their field notes, and added explanations for a more accurate description.

3.5. Procedure

The first application was conducted in 2019 (face-to-face group), and the second in 2020 (online group). In both applications, we invited various schools to participate in the study. Those school principals who voluntarily agreed to participate were asked to authorize the teachers and students in the respective courses according to the University's ethical standards. Meetings were sustained with each teacher to explain the intervention and plan the classes in which the activities would be implemented.

During the intervention, one or two team members observed the face-to-face classes in which the designed teaching and learning activities were implemented by the teachers, using the observation protocol described above and took field notes on each component. Two researchers recorded and observed the online classes using the same instrument applied during the face-to-face classes. After the class finished, the observers transcribed the scores for each indicator. The researchers observed and evaluated 56 face-to-face classes lasting between 45 and 90 minutes and 47 online classes lasting 45 minutes.

Finally, before each activity, the teachers met with a member of the research team to address questions, review the materials, and explore the contents in depth.

3.6. Analysis of the observation protocol

The observation instrument was analysed using three sequential procedures. First, the Weighted Kappa Coefficient for face-to-face and online observations was calculated using the procedure described by Cohen (1968). The results demonstrated that there was a substantial and moderate consistency between the observers (0.65 and 0.54, for face-to-face and online modalities respectively) (Landis and Koch (1977).

Second, Cronbach's alpha coefficient was calculated, indicating excellent reliability for both the face-to-face ($\alpha = .93$) and online ($\alpha = .92$) instruments. As Table 2 shows, the results revealed a good level of

Table 1. Dimensions and indicators of face-to-face teaching quality.

Dimensions	Indicators
1. Efficient classroom management	• Holds structured classes • Ensures that the class progresses in an organized manner • Uses learning time efficiently
2. Creates a safe and stimulating learning environment	• Ensures that the classroom is managed efficiently • Ensures that there is a relaxed atmosphere • Promotes mutual respect • Promotes self-confidence among students • Shows respect for students using appropriate language and behaviour
3. Develops clear and activating instruction	• Ensures the cohesiveness of the course • Encourages students' independence • Promotes cooperation among students • Presents objectives at the outset of the lesson • Evaluates whether objectives have been achieved at the end of the lesson • Provides clear instructions and explanations • Gives clear explanations of learning materials and assignments • Provides feedback to students • Involves all the students in the class
4. Teaches learning strategies	• Uses teaching methods that activate students • Ensures that teaching materials are oriented towards transference (i.e. that they can be applied in other contexts) • Encourages the use of control activities
5. Promotes student engagement	• Provides activities and interactive teaching • Ensures that there is a good level of student engagement

Table 2. Reliability scale.

Dimensions	Number of indicators	Face-to-face	Online
Efficient classroom management	4	0.74	0.82
Learning environment	7	0.82	0.75
Clear and activating instruction	7	0.79	0.8
Teaching of learning strategies	3	0.75	0.73
Student engagement	1	–	–
Total scale	22	0.93	0.92

internal consistency for both the general observation instrument and the indicators in both modalities (Streiner, 2003).

Third, a Pearson correlation analysis was conducted between the indicators and the total score of each dimension in each observed class to establish whether there was a relationship between the behaviours observed in each dimension. The results of the correlation analysis for both groups were similar to those reported by Noben et al. (2022) and are therefore considered adequate (Table 3).

To measure teachers' pedagogical behaviour quantitatively, we calculated the average scores assigned by the observers for each indicator in the observation instrument in each observed class, which helped guide the qualitative analysis. Then, the mean scores of the five dimensions between the face-to-face and online groups were compared with independent t-tests to identify differences in the frequency of the activities.

The field notes describing teachers' activities for each indicator were grouped into the corresponding dimensions to perform a directed content analysis (Hsieh & Shannon, 2005) following four steps. For this, the unit of analysis was defined as all utterances that described an action or activity performed by the teacher during the lesson. Based on this definition, the first step was to identify the units of analysis present in the observers' field notes for each group of teachers. Once identified, the second step was to group them into activity types (codes) using the indicators of each dimension as predefined categories to group the codes. For example, the type of activity 'address technical issues' was grouped under the indicator 'Uses the time for learning efficiently', the activities 'teacher checked in with groups', and 'teacher asks closed questions about student's progress' were grouped under the indicator 'Provides feedback to students'. Third, the types of activities grouped in each indicator for teachers in the face-to-face and online groups were compared to identify the similarities and differences. Although for the first and second steps, the field notes were blinded to the modality (online or face-to-face), in some cases the descriptions revealed the modality.

Table 3. Correlations between the dimensions of the observation guidelines.

	Face-to-face group					Online group			
	Efficient classroom management	Learning environment	Clear instruction	Teaching of learning strategies	Student engagement	Efficient classroom management	Learning environment	Clear instruction	Teaching of learning strategies
Learning environment	.654**					.559**			
Clear and activating instruction	.671**	.726**				.810**	.583**		
Teaching of learning strategies	.690**	.651**	.615**			.669**	.635**	.741**	
Student engagement	.681**	.580**	.557**	.657**		.704**	.527**	.758**	.652**
Total score	.864**	.833	.818	.859	.854	.880	.728	.907	.875

Note. ** $p < .01$.

Finally, the types of activities were characterized using contextual information available in the field notes, which included information about students' behaviour (e.g. instances of misbehaviour, students turning off their cameras, etc.), with a particular focus on distinguishing differences.

4. Results

4.1. Frequency of activities

Two dimensions showed significant differences: 'Efficient classroom management' ($t(99.7) = -5.52, p < .001, d = -1.09$), which presented higher scores for the online group, and 'Creates a safe and stimulating learning environment' ($t(100) = 2.73, p = .007, d = .53$), that showed higher scores for the face-to-face group.

Then, independent samples t-tests were conducted to compare the mean scores of indicators. A Bonferroni correction was applied to account for multiple comparisons, adjusting the significance threshold to $p < .00227$. As depicted in Figure 2, there were differences in 8 of the 22 indicators, that belong to the dimensions of 'Efficient classroom management', 'Creates a safe and stimulating learning environment', and 'Develops clear and activating instruction'. The majority of these differences favoured the online group, which obtained higher scores in most indicators, except for 'Ensures the cohesiveness of the course', 'Promotes cooperation among students', and 'Evaluates whether objectives have been achieved at the end of the class', which showed higher scores for the face-to-face group of teachers.

Figure showing mean scores for the two groups of teachers -face to face and online modalities—across the indicators and dimensions observed. Each indicator is represented by a pair of points: blue for the face-to-face group and orange for the online group, with vertical lines indicating the difference. The x-axis lists the indicators such as 'Holds structured classes', 'Ensures that the class progresses in an organized manner', 'Uses learning time efficiently', etc. The y-axis represents mean scores on a Likert-type scale from 1.0 to 4.0. Overall, the online group shows consistently higher mean scores than the face-to-face group, with statistically significant differences in several indicators, denoted by asterisks above the data points (generated by AI and edited).

4.2. Activity quality

To understand the quantitative differences reported in the previous section, we present a summary of the activities implemented by teachers in both groups, highlighting the similarities and differences in teaching actions across the two contexts.

4.2.1. Efficient classroom management

Teachers used the sequence of activities available on the online platform to structure their classes when teaching. This includes slides, presentations, and activities using digital tools. Teachers in the face-to-face group had a guide for each class that was reviewed with the researchers before each session. A comparison of this structure shows that teachers' adherence to the sequence of proposed activities was greater in the online group because they followed the teaching guide available on the platform. By contrast, teachers in the face-to-face group followed the sequence of activities from memory.

Concerning the classroom climate, the students' behaviours, both in the face-to-face and online settings, impacted the class progress. This is due to, for example, conversations among students in the classroom or background noise during videoconferences. In the latter scenario, teachers could mute the students' microphones, but they did not overuse this tool. Mostly, they asked their students to do it alone, especially when a peer was presenting. If this was unsuccessful, they would silence the students' noisy microphones. Although the chat was enabled, student interactions were not observed during the online class periods.

Regarding the use of time, in addition to the administrative tasks required in both scenarios, teachers in the online group had to address technical issues (e.g. explain how to access the online platform). The students were encouraged to turn their cameras on, but most kept them off. Thus, it was difficult for

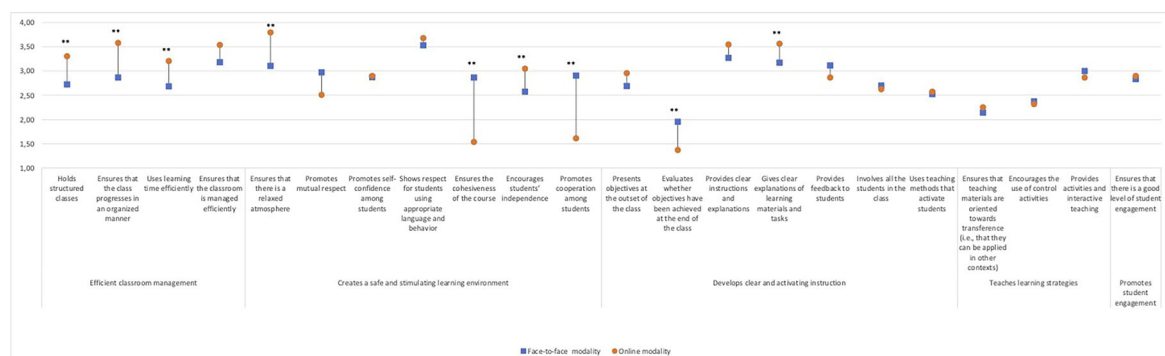


Figure 2. Average scores of the teachers from the face-to-face and online groups.

Note: ** $p < .00227$.

the teacher to receive feedback on what the students were doing during class. In this scenario, the teachers were dedicated to following the class as planned.

As for classroom management, the main challenge for the teachers in the online group was that some students did not have the technical skills required to use the available digital tools. In both cases, the teachers used the materials provided by the researchers, which for online classes, the resources were provided on the platform.

To sum up, concerning *Efficient Classroom Management*, the teachers in the online group found that structuring the class was easier because pre-designed resources could be used, and managing the class climate was easier due to the absence of distractions in classrooms where students interact.

4.2.2. Learning environment

In the online scenario, the platform used to conduct the sessions was novel for all participants. Thus, most teachers were sympathetic to their students when they failed to follow a procedure related to completing tasks or when there were issues with communication, access, or usage of certain applications. This was widely reported while using Google Classroom. By contrast, during the face-to-face sessions, the disruptions due to the behaviour of the students were a source of stress during the classes.

Teachers in the online group used some of the functions offered by the videoconferencing system to promote respect, such as asking students to use the available tools to indicate that they wanted to speak during the class. One of the most common responses to an abrupt interruption, noise, laughter, or argument was to call on students to respect each other's opinions or let the person speaking finish. On the other hand, teachers in the face-to-face group had a broader perspective of the situations that were taking place among the students during class, which allowed them to intervene more effectively.

Regarding promoting students' self-confidence, teachers in both groups provided positive reinforcement when they shared an opinion, formulated an argument, or contributed with their prior knowledge or experience related to the class topic.

The actions to maintain class cohesion and cooperation among students were barely observed online, unlike the face-to-face group, in which teachers frequently organized their students into groups. Teachers in the online group rarely encouraged student interaction and did not generate group activities. Interactions between students or discussions of specific topics were mainly spontaneous and around the students' interests. As these discussions diverged from the class topic, teachers focused on shortening interventions among them. Students' participation during the class was limited to answering teachers' questions.

As for the students' independence, teachers in the online group asked and trusted students to complete planned activities on their own, given that, in most of the observed classes, they could not verify their students' progress.

4.2.3. Clear and activating instruction

Most teachers in the online group stated the lesson objectives at the beginning of the sessions and informed their students which stage of development of the final product they had reached. These

guidelines were explicit in the research team's presentations and materials. On the contrary, teachers from the face-to-face group revisited activities from prior classes and skipped the presentation of class objectives.

Teachers rarely evaluated the achievement of objectives for each class in either group, but it was even less common in the online group. Specifically, in online classes, teachers only asked confirmation questions, most of which were not answered by the students or required only a 'yes' or 'no' answer without waiting for more in-depth consideration or reflection from the students.

Concerning instructions and explanations, teachers activated students' prior knowledge in both scenarios and applied a structured instructional sequence. This practice can be explained by the teachers' use of the presentations and guides available on the platform and the fact that they relied on these activities to sequence their online sessions. For example, online classes used videos explaining how to perform internet searches effectively. By contrast, in the face-to-face group, teachers directly provided these explanations, which varied in clarity and completeness.

Similarly, teachers in both groups provided clear explanations of learning materials and tasks. In the online group, they reviewed the materials available on the platform with the students and addressed their questions immediately. On the contrary, teachers in the face-to-face group distributed materials and often asked if there were any questions.

Regarding feedback for students, teachers in the face-to-face group frequently checked in with groups, ensuring that they were completing the work correctly and providing any necessary feedback. Some teachers in the online group ensured that students were reviewing the documents that they had been working on and provided them with the necessary feedback. In most cases, however, these teachers asked closed questions about their progress and provided general feedback.

It was challenging for teachers in both groups to involve all students in the class. Although they assigned work that would encourage active participation by posing questions that involved reflection, most teachers in the face-to-face group had difficulty maintaining order and ensuring that all students were listening and working. Teachers in the online group had difficulty getting students' answers because most kept their cameras and microphones off throughout the session.

Likewise, regarding the teaching methods used to activate students, it was difficult for teachers in the face-to-face group to guide conversations and discussions due to constant interruptions. This was also the case for teachers in the online group, due to the lack of student participation. In either scenario, teachers did not use technological tools to facilitate and guide the discussion, such as quick surveys.

4.2.4. Teaching of learning strategies

Regarding teaching materials, while they were focused on transfer (explicit connections were made that allowed students to apply their knowledge to other contexts) in both scenarios, teachers often failed to take advantage of those opportunities. This was partly due to the teachers' focus on order and discipline in the face-to-face group and a lack of participation in the case of the online group. Similarly, the reference to the use of control activities was observed in a few cases, possibly for the same reasons.

Interactive teaching was mainly focused on the interaction between the teacher and individual students in both scenarios. In the face-to-face group, it was more common for teachers to generate responses from students and organize them into groups to generate interactions, which was more challenging in online classes.

4.2.5. Promoting student engagement

In both scenarios, teachers tried to ensure that students actively listened to the instructions. However, this was challenging in the online group due to the lack of visual feedback, given that students turned off their cameras. The face-to-face group also showed trouble because of the need to maintain an appropriate environment for their lessons without constant interruptions due to the students' behaviour.

5. Discussion

This study sought to compare the quality of teaching actions in face-to-face and online synchronous education, using a structured class observation instrument (van de Grift, 2014), identify and define a set

of indicators useful to observe teaching quality in a synchronous online environment, and propose an instrument that can be used in both scenarios. Thus, quantitative and qualitative techniques were used to compare the teaching activities of teachers in synchronous online classes with those of teachers in the face-to-face group.

In what follows, we address the research questions, showing the similarities and differences in quality teaching actions. We also provide recommendations from the literature that complement the observation protocol.

5.1. Similarities and differences in the quality of teaching actions between face-to-face and online synchronous teaching in K-12 settings

5.1.1. Efficient classroom management

Regarding efficient classroom management, it was easier for teachers in the online group to maintain structure and a class thread because each session was structured around the materials available on Google Classroom (O'Brien & Fuller, 2018). This is consistent with the results presented by Reeves (2010), who argues that scripts make it easier for teachers to implement new teaching methods. While a script was provided in both cases, with short and clearly defined segments (Borup et al., 2014), teachers in the online group organized their classes around it, following it step by step. In terms of teaching quality, these scripts allowed them to follow the instructional design of the class. However, for face-to-face teachers, adhering to the proposed sequence of activities proved more challenging, as they had to rely primarily on memory due to the impracticality of consulting the written guide during the lesson. This difficulty appears to be linked to the inherent characteristics of in-person teaching, which typically demands that educators draw upon their professional judgment to respond dynamically to student behaviour and evolving classroom conditions—requiring a high degree of flexibility and real-time responsiveness (Karasova & Nehyba, 2023). Another factor that proved challenging in maintaining order in the classroom is student discipline. In Chile, 40% of teachers agree or strongly agree that there is much noise in the classrooms. The average for OECD countries is 26% (OECD, 2019). In this sense, due to the format of virtual interaction, student distractions and/or interruptions coming from the class were less frequent during online classes. This situation led to fewer interruptions and more fluid sessions overall, which students often evaluate positively, as they associate online learning with time efficiency (Gherheş et al., 2021). Nevertheless, other studies (Delcker & Ifenthaler, 2021) have indicated that teachers in synchronous online environments must devote some attention to solving technical problems during their classes, thus wasting lecture time (NSQ, 2025; Pulham & Graham, 2018; Rehn et al., 2018). Additionally, it's important to note that teachers cannot control the environments from which students connect to virtual classes, which may involve considering extra variables beyond this research's scope. In this context, a key limitation of synchronous online instruction identified in the literature is the diminished teacher control over students' behaviour and attention (Gherheş et al., 2021; Su et al., 2024). This constraint presents challenges for monitoring student attentiveness and fostering social presence (Kreijns et al., 2022). Consequently, the lower incidence of observable disruptions in online classes should not be interpreted as indicative of greater instructional effectiveness. Future research incorporating measures of learning outcomes and student engagement would be valuable in elucidating the relationship between classroom management and instructional quality across different modalities. *Learning Environment*

As for the learning environment, the indicators associated with student-teacher interactions presented a better performance for the face-to-face scenario. Activities associated with mediating or stimulating interactions among students were observed significantly less frequently in the online group than in the face-to-face one. This is consistent with the greater frequency of activities linked to encouraging students' independence observed in the online group, which Archambault et al. (2022) emphasised in the learner autonomy pillar. While the lack of interaction among students aligns with the results reported in other studies (Ewing & Cooper, 2021; Gao & Shi, 2023; Yan et al., 2021), Borup et al. (2020) observed that interaction is vital to creating a *Community of Inquiry*. In order to make it possible, the teacher must conduct activities that promote this interaction and thus facilitate learning in synchronous online classes (Caskurlu et al., 2020; Kurt et al., 2022; Prestidge et al., 2025; Zhang & Lin, 2021) and promote cognitive

engagement (Borup et al., 2020). However, it is important to consider that in a traditional classroom, the teacher manages the class with their physical presence. In a virtual environment, they need to coordinate pedagogical and technological aspects to create a presence (O'Brien & Fuller, 2018; Rehn et al., 2018), which poses additional challenges for teachers, particularly if students participate with their cameras off (Ewing & Cooper, 2021). To address this, authors recommend using emoticons, breakout sessions for students' interaction in small collaborative groups, games, and activities to promote team building (Archambault et al., 2022; O'Brien & Fuller, 2018).

5.1.2. Clear and activating instruction

Concerning the development of clear and activating instruction, results show that teachers in the online group hold activities related to providing instructions and explaining materials more than teachers in the face-to-face group, as they are available through the platform. However, the activities associated with evaluating learning and providing feedback to students were less frequent. This result is similar to the experience described in other studies (Means & Neisler, 2021; Yan et al., 2021). It is important to consider that the assessment and provision of feedback on learning is not only an essential element of quality teaching (Danielson, 2007; van de Grift, 2014), but also for enhancing students' behavioural engagement in synchronous and blended teaching (Borup et al., 2020). In this regard, authors suggest that presenting to students expectations in advance and codes of conduct during synchronous class promotes the engagement of students (Ewing & Cooper, 2021; Krutka et al., 2019), also formative assessment with feedback is an effective strategy to promote self-pacing (Pulham & Graham, 2018) and learner agency (NSQ, 2025), allowing higher levels of interactivity that leads to teacher presence (Rehn et al., 2018). In this line, the use of interactive tools to support learning (e. g. votes, quizzes, among others) (Borup et al., 2020; Danielson, 2020; Darling-Hammond et al., 2020) is an effective strategy to facilitate feedback and formative assessment.

5.1.3. Teaching of learning strategies

Activities associated with teaching-learning strategies are infrequent in both contexts. These results align with other studies that show that this aspect of teaching is difficult for teachers (van de Grift et al., 2014). From the perspective of the communities of inquiry model, this dimension is associated with cognitive presence, specifically the development of critical thinking (Garrison et al., 2001) or, as other authors have proposed (Shea & Bidjerano, 2012; Zhang & Lin, 2021), the 'learning presence' (self-regulation). The recommendations in this dimension are associated with the use of collaborative approaches, where students can engage in challenging learning environments, and teachers can promote students' work through strategies such as collaborative problem-solving activities, Flipped Classroom models, Think-Pair-Share, concept mapping, and ranking activities (Archambault et al., 2022) or encouraging the use of a variety of information sources, techniques, and approaches to solve problems through different activities (*Standards for K-12 Online Learning in British Columbia*, 2021).

5.1.4. Promoting student engagement

Teachers implemented activities aimed at ensuring student engagement in both online and face-to-face sessions. Teachers' activities in both scenarios were oriented toward maintaining students' attention by promoting their cognitive engagement (Borup et al., 2020). However, one must consider that it was difficult to verify students' engagement in online classes due to the lack of visual feedback. In this sense, students' presence in classes, though a requirement for engagement, is not the same as authentic engagement (Ewing & Cooper, 2021).

5.2. Observation protocol applicable to both contexts

In summary, results show that the components related to structure, development, and teaching were developed efficiently by teachers in the online group, sometimes out-performing teachers in the face-to-face group. However, the aspects that involve collaboration among students and feedback were less achieved by teachers in the online group, which works against opportunities to reach the necessary students engagement (Armstrong-Gallegos & Sandoval-Obando, 2022; Borup et al., 2020), and may explain

their lack of participation and motivation, as reported in other studies (Delcker & Ifenthaler, 2021; Ewing & Cooper, 2021; Fiş Erümit, 2021). This is evident in how Rehn et al. (2018) describe teachers who adopted approaches focused on themselves (i.e. teacher-centred) while teaching online instead of a student-centred approach.

Also, the teaching of learning strategies is an aspect to be developed in both scenarios. In general, these results are consistent with other studies (van de Grift et al., 2014), which show that the development of skills associated with *Efficient Classroom Management* and *Creating a safe and stimulating learning environment* precede the skills associated with the teacher's impact on students, such as *Developing clear and activating instruction* and *Teaching learning strategies*. However, in the case of online teaching, the lack of interaction with and among students could work against the achievement of learning goals.

With regard to the associations among the observed dimensions, the correlation analysis (Table 3) indicates strong interrelationships. For example, effective classroom management showed a robust positive correlation with student engagement in both instructional modalities ($r = .681$ and $r = .704$), suggesting that well-structured, low-disruption environments are often accompanied by higher levels of student involvement. Similarly, the dimension of clear and activating instruction was strongly associated with both the quality of the learning environment and the teaching of learning strategies. This implies that when instructional delivery is clear and stimulating, it tends to align with a supportive classroom climate and the integration of metacognitive or strategy-based teaching approaches. These results reinforce the conceptualization of teaching quality as a multidimensional and interdependent construct, wherein strengths in one domain frequently align with enhancements in others (Borup et al., 2020; van de Grift, 2014).

These differences show that evaluating the quality of teaching in synchronous online teaching settings requires additional indicators tailored to its unique characteristics. Based on this, in Table 4 we propose a set of actions to observe that complement those traditionally considered in face-to-face teaching scenarios, considering both the results of the analysis of the field notes as well as teaching activities recommended in the *Community of Inquiry* framework (Garrison et al., 2010) as well other online teaching studies and recommendations (e.g. Baeza & Hinostroza, 2025; Borup et al., 2014; Darling-Hammond et al., 2020; O'Brien & Fuller, 2018; Rehn et al., 2018), that have shown to improve students' learning experiences, particularly those associated with the teaching presence.

In examining the teaching actions in both scenarios, it is possible to recognize the need for multiple dimensions in evaluating synchronous online teaching quality, demonstrating the complexity of this learning scenario. Furthermore, learner-centred approaches are essential, focusing on building learning communities through online presence (Garrison et al., 2010), active learning, learner agency, mastery learning and ongoing feedback, and personalizing the learning process (Archambault et al., 2022). These recommendations highlight the significance of fostering meaningful learning experiences in online environments to be effective. However, while the identified dimensions and practices provide a framework for evaluating and improving online synchronous teaching, the implementation and effectiveness of these elements may vary. The lack of in-person interaction made it challenging to gauge authentic student engagement, highlighting a gap between mere presence and genuine participation.

As for the limitations, the first is the low number of teachers, which reduces the representativeness of the results and prevents us from generalizing them to other populations and contexts. Therefore, given the diversity of teaching styles, student demographics, and institutional contexts that characterize K-12 education, the conclusions drawn should be interpreted with caution. Second, although the teaching method used during face-to-face and online classes followed the same sequence of steps, the adaptation of the resources and materials could generate differences in the activities implemented by the teachers. Nevertheless, given that several classes were observed for each teacher, the activities conducted should represent the repertoire of activities deployed by each instructor. The quality of teaching actions was evaluated using a distinct conceptual framework, namely, the 'International Comparative Analysis of Learning and Teaching (ICALT)' (van de Grift et al., 2014). It is necessary to acknowledge that the chosen model may have considered certain variables while potentially overlooking others, which might hold equal significance in depicting online teaching methodologies. As such, it is imperative to recognize the plausibility of other alternative models that could equally contribute to the comprehensive delineation of these pedagogical practices. Finally, it is important to note that teachers in the online

Table 4. Actions to observe in face-to-face and synchronous online teaching scenarios.

Face-to-face class indicators	Recommendations for actions to be observed in online classes
1. Efficient classroom management • Holds structured classes • Ensures that the class progresses in an organized manner • Uses learning time efficiently • Ensures that the classroom is managed efficiently	• Uses support resources to guide the development of the class (O'Brien & Fuller, 2018). • Holds short classes with clearly defined segments (Borup et al., 2014). • Addresses technical problems related to the use of technology (for the teacher and the students) (NSQ, 2025; Pulham & Graham, 2018; Rehn et al., 2018)
2. Creates a safe and stimulating learning environment • Ensures that there is a relaxed atmosphere • Promotes mutual respect • Promotes self-confidence among students • Shows respect for students using appropriate language and behaviour • Ensures the cohesiveness of the course • Encourages students' independence • Promotes cooperation among students (face-to-face) *	• Develops strategies to evaluate students' moods, particularly if they have their camera off, using, for example, emoticons (O'Brien & Fuller, 2018). • Develops activities that involve student interaction and collaboration by creating workrooms, forums, class discussions, etc. (Borup et al., 2014; Darling-Hammond et al., 2020; O'Brien & Fuller, 2018; Prestridge et al., 2025; Rehn et al., 2018).
3. Develops clear and activating instruction • Presents objectives at the outset of the class • Evaluates whether objectives have been achieved at the end of the class • Gives clear instructions and explanations • Gives clear explanations of learning materials and tasks • Provides feedback to students* • Involves all the students in the class • Uses teaching methods that activate students	• Presents expectations in advance and codes of conduct during synchronous class (Ewing & Cooper, 2021; Krutka et al., 2019) • Uses interactive tools to support learning (votes, quizzes, etc.) (Borup et al., 2020; Danielson, 2020; Darling-Hammond et al., 2020) • Uses formative assessment (tools) during classes (NSQ, 2025; Prestridge et al., 2025) • Uses strategies such as email or messages to provided individual feedback to students ((Pulham & Graham, 2018)
4. Teaches learning strategies • Ensures that teaching materials are oriented towards transfer (i.e. can be applied in other contexts) • Encourages the use of control activities • Provides activities and interactive teaching	• Explicitly teaches self-regulation strategies (Darling-Hammond et al., 2020; Zhang & Lin, 2021) • Provides resources to facilitate student self-regulation, such as activity checklists (Darling-Hammond et al., 2020)
5. Promotes student engagement • Ensures that there is a good level of student engagement	• Includes activities that consider parent/guardian and/or peer involvement in asynchronous activities (Borup et al., 2014; 2020)

Note. *In the online scenario, technological tools must be used to implement these actions adequately, which is why they are included in both columns.

group did not receive training for online synchronous instruction, since they were required to teach online due to the COVID-19 pandemic. This could imply that they implemented a limited set of quality teaching actions. To overcome this, online synchronous quality teaching actions were complemented with recommendations from the literature. In this regard, future research should validate the proposed observation protocol across broader and more diverse educational contexts and examine to what extent teacher actions in online environments relate to actual student learning outcomes.

6. Conclusion

The results of this study show similarities and differences in the actions that teachers display in each scenario, that is, while online teaching excelled in structured and teacher-driven components, challenges remained in fostering student interaction, collaboration and feedback. Conversely, face-to-face teaching was more effective in promoting student engagement and cooperative learning, benefiting from direct interactions and a shared physical space.

The main contribution of this study is the proposed observation protocol presented in Table 4, which emphasizes the importance of observing teaching actions associated to teaching presence, promoting student autonomy, and fostering meaningful interactions, as informed by the Col framework and other online teaching studies.

Regarding the study's implications, the findings offer a valuable contribution to teacher training programs by supporting the integration of quality indicators for synchronous online teaching, as advocated by Heap et al. (2021). Moreover, building on these results, we recommend that both initial teacher education and ongoing professional development initiatives incorporate the proposed observation protocol and its associated set of indicators as a structured framework for promoting effective instructional

practices in face-to-face and synchronous online settings. Engaging with this instrument through analysis and discussion can stimulate critical reflection on pedagogical models and enhance understanding of their application across diverse teaching contexts. For policy designers, the proposed instrument can be used to complement teacher appraisal system, incorporating synchronous online teaching quality indicators.

Also, for practitioners that engage in synchronous online teaching, the observation protocol can be used to reflect on their practice, contrasting their own teaching actions with those considered quality teaching behaviours. Complementary they serve as a guide for teachers designing online classes, including activities oriented towards favouring the teaching presence to create Communities of Inquiry.

Finally, they can also serve as a foundation for future research on the observation of synchronous online classes.

Ethical approval

The research was approved by the ethics and scientific committee from the University of La Frontera, Chile (Acta N° 035_21).

Author contributions

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Data availability statement

The data will be made available on reasonable request.

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