







# The Barometer of Physical Education in the COVID-19 Pandemic in Catalonia

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## Abstract

COVID-19 has had a significant impact on the functioning of many professional fields, including education. The aim of the study was to analyse what has happened in physical education in primary and secondary schools in Catalonia (Spain) during the COVID-19 pandemic. To this end, after a thorough review of the existing literature, a questionnaire was designed and implemented to identify the impact of COVID-19 in relation to changes in curricular decisions, attention to diversity and compliance with protocols, safety and hygiene standards generated by the pandemic in the classroom. To determine validity, the Delphi method was used, conducting a pilot test in the first phase and the analysis of two panels of experts in the following two phases, using Cronbach's alpha coefficient to delimit reliability. The questionnaire was answered by 629 primary and secondary physical education teachers, and the results showed that they made significant changes in the typology of teaching and learning activities and in the specification of curricular content, ensured physical distance between pupils, and ensured the application of health and safety protocols. There was an increased use of technology, both to facilitate communication with learners and to increase autonomy and self-regulation of learning. The methodological changes brought about by the pandemic are evident and envisage a hybrid model of physical education with a greater presence of technology.

**Keywords:** education, pandemic, questionnaire, teachers.

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## Introduction

COVID-19 has had a global socio-economic impact that has disrupted the functioning of many professional fields, with the education sector being one of the most affected: closed schools, transition from face-to-face to digital education and uncertainty in educational processes (Trujillo et al., 2020). The pandemic and the lockdown measures meant that, as of 12 March 2020, teaching was virtual, including physical education (hereafter, PE) (Posso-Pacheco et al., 2020).

Changes in the forms of assessment generated controversy and challenges (Baena-Morales et al., 2021). Education bodies proposed to facilitate the grading of participants with flexible criteria taking into account the exceptionality of the situation.

In relation to physical education, lockdown led to the prioritisation of content linked to physical fitness and health, to the exclusion of physical activity, games and sports (Baena-Morales et al., 2021).

The start of the 2020-2021 academic year was not easy. Although the Spanish health authorities allowed attendance in schools, the Ministries of Education of the different autonomous communities only provided schools with generic guidelines and recommendations in relation to preventive hygiene measures, disinfection and protocols for action, which were specified by the leadership teams in their contingency plans. Preventive measures were the teachers' main concern, given the potential risk of contagion and the enormous social sensitivity at the time. PE had to adapt to the so-called "new normal" by obeying health recommendations, but without losing its essence. Teachers and leadership teams relied on recommendations published by different institutions - national and international - on procedures in relation to learning, safety, health and security measures. In Catalonia, the document "L'Educació Física en la 'nova normalitat'" ("Physical Education in the 'new normality'", COPLEFC, 2020) was published, which emphasised the flexibility of curricular content in the face of the pandemic situation and the use of materials that maintained a safe distance. The Association for Physical Education (2020) proposed to ensure safe PE by cleaning contact surfaces, frequent hand washing, minimising contact and ensuring proper respiratory hygiene. The COLEF Council (2020a, 2020b) created two documents in which they suggested avoiding activities that do not comply with the social distancing guidance and that, due to their requirements, cannot be done without a mask. It was urged to prioritise outdoor activities, without physical contact, ensuring a distance of 1.5 metres and avoiding the use of changing rooms.

The aim of the study was to identify the impact of COVID-19 in Catalan PE classes during the first four-

month period of the 2020/21 academic year. The specific objectives of the study were as follows:

1. Determine the level of changes introduced in the different educational processes and procedures.
2. To identify whether there were differences according to the level of education (primary vs. secondary) and the ownership of the school (state vs. public and private).
3. To determine teachers' perceptions of the institutional support received in their teaching during the pandemic.

## Methodology

### Participants

The sample population for this study was Catalan PE teachers, who were invited by COPLEFC to participate through its weekly newsletter and its social networks. A total of 629 PE teachers from Catalan schools participated, 309 from primary and 320 from secondary schools, of which 75.7% were from state schools and institutes and 24.3% from private or public. The representativeness of the sample was ensured, given that the population of PE teachers in Catalonia is 3,363 teachers in primary and 1,413 in secondary (Observatori Català de l'Esport, 2021), with the required sample size being 290 teachers in primary and 263 in secondary, according to the criteria of García-García et al. (2013).

### Materials, Resources and Procedures

The development of the instruments and the methodological procedures used followed the ethical standards in sport and exercise science research and the ethical guidelines for education (BERA, 2018). The participants, previously informed about the purposes of the research, responded anonymously to a questionnaire provided by the Professional Association of Physical Activity and Sport Professionals of Catalonia (COPLEFC).

After a thorough review of the existing literature to date, the "PE Barometer in times of COVID-19" questionnaire was designed, which included 21 items divided into 4 sections: questions 1 and 2 corresponded to the categorisation of the sample (it was asked whether they worked in primary or secondary education, and whether they worked in a state, private or public school); questions 3 to 8 dealt with changes in the teaching task; questions 9 to 14 described the safety measures implemented; and finally, questions 15 to 21 answered the teachers' perception of the teaching task performed and the support received by educational institutions or professional associations.

## Validity of Resources

In order to determine the validity of the questionnaire, the Delphi methodology was followed, using three sequential phases.

In phase 1, according to the criteria of Delbecq et al. (1975), four experts, graduates in PE and with more than 15 years of experience as secondary school teachers, developed a first draft of the questionnaire (questions 1 to 16). A pilot test was carried out with the participation of 37 PE teachers. At the end of this pilot, the experts considered the questionnaire to be of interest, but proposed a qualitative improvement by adding five questions (17 to 21) that could be used to analyse the impact of institutional support for teachers in the face of the emergence of COVID-19.

In phase 2, in accordance with Rowe & Wright (2001), two experts in qualitative methodology were incorporated into the study. In order to determine the degree of understanding and appropriateness of the questionnaire's 21 questions, they validated the questions by expressing their total agreement (Yes) or (No) with each question. Content validity was checked by calculating the percentage of positive matches using "R" software (© 2019 The R Foundation for Statistical Computing) version 3.5.3. A positive match rate of 93.7% with a 95.0% confidence interval (CI) of .904 to .961 was obtained.

In phase 3, following the criteria of Worrell et al. (2013), the expert panel was expanded to 10 people, all current secondary school PE teachers with more than 10 years of employment, who were asked about the appropriateness of the questions using a Likert scale format (1 = Strongly Disagree; 2 = Somewhat Disagree; 3 = Somewhat Agree; 4 = Strongly Agree). The criterion used to keep an item in the questionnaire was that the average of expert responses exceeded 75% of the average, which on a scale of 1 to 4 represents a rating of 3 points (George & Trujillo, 2018). The experts' responses showed a mean value of  $3.8 \pm 0.2$ , in a range of mean values between 3.3 and 4 for the different questions, confirming content validation for all items of the questionnaire.

In order to assess the suitability of the questionnaire items, Cronbach's alpha coefficient was calculated and applied to the group of questions corresponding to the central object of the study (questions 3 to 8; tables 1 and 2), resulting in a value of .737, which was considered an acceptable criterion of reliability as it was higher than

an alpha value of .70. The elimination of the question corresponding to the changes in attention to diversity would have strengthened the alpha value to .771 but, given its interest, it was decided that it should be kept in the analysis of the whole group of questions, and that the main group of questions in the study had a good internal consistency.

The incorporation of Likert-type scale questions from other content blocks was discouraged as they reduced alpha values below .70.

## Results

The questionnaire was completed by 629 teachers, 309 in primary education and 320 in secondary education. Of the total number of participants, 476 teachers belonged to state schools (244 in secondary education) and 153 to private or public schools (76 in secondary education).

In the teachers' responses and in the items analysed, no significant associations were detected in the distribution of responses according to the fact of belonging to a state school or to a private or public school.

### Changes in the Teaching Task

Table 1 shows the results reported by teachers in response to the changes made to the teaching task. It can be observed that there was a significant association between the level of education (primary and secondary) and the changes introduced in teaching and learning activities ( $p = .002$ ). There were no significant differences in the changes made to teaching units, content and objectives.

The differences observed in teaching and learning activities were only significant among teachers in state schools ( $p = .015$ ), and there were no significant relationships in the case of private or public schools.

### Changes in Attention to Diversity and Communication

Table 2 shows that there is a significant relationship between educational level (primary and secondary) and changes in communication with pupils ( $p = .001$ ), however, this was not observed in the changes introduced in relation to attention to diversity. Differences in communication with students were only significant among teachers in state schools ( $p = .002$ ).

**Table 1***Changes made in the teaching task of PE teachers in the face of the COVID-19 pandemic in Catalonia.*

Education Level	<i>n</i>	Few	Quite a few	Many	Other	Chi P-value
		%	%	%	%	
Question 3: How many changes have you made to the teaching units?						n.s.
Primary	309	18.1	47.6	31.1	3.2	
Secondary	320	16.6	45.6	34.7	3.1	
Total	629	17.3	46.6	32.9	3.2	
Question 4: How many changes have you made to the content?						n.s.
Primary	309	19.4	64.1	15.2	1.3	
Secondary	320	19.1	59.1	20.9	0.9	
Total	629	19.2	61.5	18.1	1.1	
Question 5: How many changes have you made to the learning objectives?						n.s.
Primary	309	31.4	55.3	12.3	1.0	
Secondary	320	25.6	58.1	15.3	0.9	
Total	629	28.5	56.8	13.8	1.0	
Question 6: How many changes have you made to teaching and learning activities?						.002
Primary	309	9.7	59.5	30.4	0.3	
Secondary	320	10.3	45.3	43.1	1.3	
Total	629	10.0	52.3	36.9	0.8	

**Table 2***Attention to diversity and communicative relations with students in the teaching task of PE teachers in the face of the COVID-19 pandemic in Catalonia.*

Education Level	<i>n</i>	Few	Quite a few	Many	Other	Chi P-value
		%	%	%	%	
Question 7: How many changes have you made relating to attention to diversity?						n.s.
Primary	309	90.6	2.9	4.5	1.9	
Secondary	320	87.5	3.1	3.8	5.6	
Total	629	89.0	3.0	4.1	3.8	
Question 8: How many changes have you made relating to communication with students?						.001
Primary	309		92.6	2.9	4.5	
Secondary	320		83.8	9.1	7.2	
Total	629		88.1	6.0	5.9	

### Measures Relating to Hygiene and Safety

As can be seen in table 3, there was a significant relationship between educational level (primary and secondary) and changes in social distancing ( $p < .001$ ), mask use ( $p < .001$ ) and when equipment was disinfected ( $p = .29$ ). With regard to changing rooms; disinfection of equipment; and hand hygiene, no significant differences were found.

Significant differences were found in the distribution of changing rooms ( $p = .003$ ), the use of masks ( $p = .002$ ), who disinfected ( $p < .001$ ) and the social distancing ( $p < .001$ )

only among teachers in public schools, with no significant associations in private schools.

As to who disinfected the equipment, 89.2% of the teaching staff participated in the disinfection tasks, 42.4% exclusively, 40.9% with the help of students and the rest with staff from the school. Primary school teachers had a higher exclusivity in disinfection tasks (46.0%) than secondary school teachers (39.1%). Student involvement in this task was higher at secondary level (49.1%) than at primary level (32.4%).

**Table 3**

*Actions linked to hygiene and safety criteria in PE classes in the face of the COVID-19 pandemic in Catalonia.*

Education Level	<i>n</i>	%	%	%	%	Chi P-value
Question 9: Did the student body wear a mask during physical activity?						.000
		Never	Sometimes	Always	Other	
Primary	309	18.8	49.8	28.5	2.9	
Secondary	320	10.6	67.5	18.4	3.4	
Total	629	14.6	58.8	23.4	3.2	
Question 10: Has the equipment been disinfected?						n.s.
		No	It has not been used	Yes	Other	
Primary	309	1.6	2.6	93.5	2.3	
Secondary	320	1.3	2.5	94.7	1.6	
Total	629	1.4	2.5	94.1	1.9	
Question 11: When was the disinfection of equipment carried out?						.029
		Before use	After	Before and after	Other	
Primary	309	3.2	61.8	9.7	25.2	
Secondary	320	1.9	65.3	15.0	17.8	
Total	629	2.5	63.6	12.4	21.5	
Question 13: How often have pupils maintained a physical safe distance?						.000
		Almost never	Sometimes	Usually	Other	
Primary	309	11.3	70.2	17.8	0.6	
Secondary	320	4.7	64.1	31.3		
Total	629	7.9	67.1	24.6	0.3	
Question 14: What is the student body's use of the changing rooms compared to its use before COVID-19?						n.s.
		It has not been used	The same	There have been changes	Other	
Primary	309	68.6	2.3	29.1		
Secondary	320	59.4	2.2	38.1	0.3	
Total	629	63.9	2.2	33.7	0.2	

**Table 4**

*Assessment of personal satisfaction with the work carried out in the PE classes and the support received in the face of the COVID-19 pandemic in Catalonia.*

Education Level	<i>n</i>	0 %	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	Chi P-value
Question 16: Satisfaction with your own work?													n.s.
Primary	309	1.3		1.0	2.6	2.6	10.4	19.1	25.6	25.2	9.4	2.9	
Secondary	320	0.6	0.3	1.6	3.1	4.4	10.9	17.8	26.3	26.9	6.9	1.3	
Total	629	1.0	0.2	1.3	2.9	3.5	10.7	18.4	25.9	26.1	8.1	2.1	
Question 17: Support from the education administration?													n.s.
Primary	309	18.8	8.7	12.3	11.3	12.6	17.5	10.4	6.5	1.3	0.6	0.3	
Secondary	320	19.1	12.5	12.5	16.6	10.0	13.8	6.9	5.6	1.9	0.6	0.6	
Total	629	18.9	10.7	12.4	13.8	11.3	15.6	8.6	6.0	1.6	0.6	0.5	
Question 18: Support from school leadership?													.000
Primary	309	1.0	0.6	2.9	1.6	3.2	5.8	4.5	14.6	17.5	23.0	25.2	
Secondary	320	3.1	2.2	3.1	2.8	3.4	11.3	7.8	12.5	24.4	13.1	16.3	
Total	629	2.1	1.4	3.1	2.2	3.3	8.6	6.2	13.5	21.1	18.0	20.7	
Question 19: Support from COPLEFC?													n.s.
Primary	309	4.2	0.6	1.6	2.9	4.2	18.1	11.0	21.4	22.3	9.7	3.9	
Secondary	320	4.7	1.6	2.8	3.1	4.1	13.4	10.3	23.8	18.8	12.8	4.7	
Total	629	4.5	1.1	2.2	3.0	4.1	15.7	10.7	22.6	20.5	11.3	4.3	

## Perceived Institutional Support

With regard to knowledge of the document "L'Educació Física en la 'nova normalitat'" (COPLEFC, 2020), 66.6% of teachers said they were familiar with it, with no differences depending on the level of education. As for the COLEF Council document (2020a), although more teachers (70.4%) said they were familiar with it, there were significant differences ( $p < .001$ ) in the knowledge of secondary school teachers (82.2%) compared to primary school teachers (58.3%), both in state and public schools ( $p < .001$ ).

Table 4 shows the rating (on a scale from 1 to 10) of the perception of the support received by the educational administration, the professional school and the leadership teams, as well as the personal satisfaction with the work done in the PE lesson. There was only a significant correlation between the level of education and the perception of support received from school leadership ( $p < .001$ ). These

differences were only observed among teachers in state schools ( $p < .001$ ).

The perception of the support received by the educational administration was significantly different ( $p < .001$ ) according to the existing knowledge of the document "L'Educació Física en la 'nova normalitat'" (COPLEFC, 2020). Of the teachers who were aware of the document, 3.6% rated their level of satisfaction from 0 to 3 and 45.6% rated it from 8 to 10.

In relation to the difficulty teachers had experienced with the adaptations made as a result of the pandemic, 67.7% of teachers reported not having experienced too many difficulties, with a higher percentage of difficulties or other circumstances ( $p = .042$ ) for secondary school teachers (33.1% and 3.8%) compared to primary school teachers (24.6% and 2.9%). Only in state schools were there significant differences in the distribution of teacher-perceived difficulties ( $p = .014$ ).

## Discussion

The unexpected outbreak of the COVID-19 pandemic triggered a radical change in teaching. At the start of the 2020/21 academic year, face-to-face teaching was enabled in Spanish classrooms; however, the official bodies that regulate education in the different autonomous communities did not specify entirely clear and specific measures that would allow teachers to carry out their role without undue uncertainty.

In relation to the group analysed, the COPLEFC and the General Council of Physical and Sports Education produced documents with recommendations for teachers (COLEF Council, 2020a, 2020b; COPLEFC, 2020), which were the only aid in the novel situation, which radically changed the teaching and learning processes at school.

The impact of the pandemic on the teaching profession has been extraordinary, but given that it is still recent and that educational realities and policies in different countries have varied, there is not much literature on the impact of COVID-19 in our classrooms. We therefore developed our aim to identify the impact of the pandemic on PE classrooms in Catalonia during the first four-month period of the 2020/21 academic year.

## Teaching and Learning Activities

The data in table 1 confirms that the widespread perception that the pandemic has led to a rethink in the type of teaching and learning activities is a reality (89.2% of the teachers surveyed said they had made some or many changes). The COLEF Council documents (2020a, 2020b) pointed out the need to prioritise non-contact activities, outdoor activities, the maintenance of a safety distance of 1.5 metres, the preparation and disinfection of equipment at each session and the distribution of students in bubble groups. More individual activities (Varea & González-Calvo, 2020) such as games and implement sports made it easier to keep a safe distance and to disinfect afterwards. On the other hand, in collective games and sports, rules had to be adapted to control the physical proximity (COLEF Council, 2020a).

One possible explanation for the higher number of changes made by secondary school teachers found in this study could be that the document produced by COPLEFC (2020) was specifically targeted at secondary school teachers.

## Content

The type of content worked on in PE classes was conditioned by the pandemic situation, as corroborated by 79.6% of teachers who stated that they had made a lot or many changes (table 1). COPLEFC (2020) advised teachers to be flexible in the selection of curricular content, choosing those that best fit the health recommendations on hygiene and distancing. By understanding curricular contents as tools at the service of the aims (González-Arévalo, 2005) and urging the curriculum itself to be flexible in terms of its

prioritisation, the post-lockdown situation has amplified this flexibility, despite the conditioning factors imposed by health regulations. In the face of a hybrid PE model combining virtual and face-to-face, SHAPE America (2020) advised doing activities at home that had been previously learned at school, linked to basic motor skills, and that could be done individually or with another family member, while at school doing physical fitness, dance, yoga or athletics activities, that met the physical distances and required little material.

## Teaching Units

79.5% of teachers reported having made a lot or quite a lot of changes in the teaching units (table 1). This is not surprising, as COVID-19 meant that space occupation had to be scheduled in a coordinated and disinfection-friendly manner (PHE-EPS Canada, 2020), as well as accelerating digitisation and the integration of technology in schools and teacher training (Donitsa-Schmidt & Ramot, 2020). This has made it possible to rethink methodological strategies to adapt them to hybrid environments that combine face-to-face and virtuality, and a more technological PE that explores new forms of expression of movement is beginning to be observed (Varea & González-Calvo, 2020). Along these lines, Koehler & Mishra's (2009) TPACK model is a conceptual framework of reference for online teaching (Murray et al., 2020) to be taken into account in post-pandemic PE.

The pandemic has opened the door to methodological change, moving from a more directive teaching model to one that promotes self-regulation, decision-making and learner autonomy (SHAPE America, 2020).

## Learning Objectives

Only 13.8% of teachers reported having incorporated many changes in the objectives (table 1), probably due to the fact that, once the course had started, most teachers decided to maintain the planned objectives and adapt contents and methodologies based on the evolution of the pandemic. However, the pandemic situation opens the door to a rethinking of the objectives of the participant (Hortigüela-Alcalá et al., 2021).

## Attention to Diversity

89.0% of the teachers stated that they were unable to attend to the specificity of the students who required more personalised attention (table 2).

## Communication with Students

92.6% of primary school teachers and 83.8% of secondary school teachers indicated that they had made few changes in communication with students. However, the changes that have occurred are probably the result of online teaching in lockdown.

The pandemic has generated social distancing and peer-to-peer rapprochement at the virtual level that has highlighted the need to find novel methodologies to engage online learners and generate meaningful learning in as yet unexplored environments (O'Brien et al., 2020).

The pandemic led to the sudden and forced use of different virtual tools with which to communicate with families, as well as the personalisation and attention of students (Varea & González-Calvo, 2020). Along these lines, teachers expressed a need for ICT training in order to integrate ICT in the classroom (Baena-Morales et al., 2021), an aspect that coincides with the need to develop and improve the digital competence of PE teachers today (Menescardi et al., 2021).

### Social Distancing

One of the most significant impacts of COVID-19 on PE has been physical distancing measures, which have led to a reduction in experiential practices (Association for Physical Education, 2020; O'Brien et al., 2020). Outdoor PE classes (PHE-EPS Canada, 2020) and individual and non-contact physical practices (Varea & González-Calvo, 2020) have been encouraged.

In classroom explanations and activities, teachers frequently (24.6%) or sometimes (67.1%) recalled the importance of keeping safe distances, with a higher percentage in primary education, probably due to the younger age and greater immaturity of the pupils.

### Use of Face Mask

Having found no other studies in the literature on the use of masks or distancing at different educational stages, this study found that 18.8% of primary school teachers and 10.6% of secondary school teachers did not use a mask. The recent study by Hortigüela-Alcalá et al. (2021) points out the perception of PE teachers of the loss of the pedagogical character of the participant due to the influence of distance, not being able to share material and the use of the mask. Emotional transmission is reduced by limiting teacher-student bonding and group cohesion and learning (COLEF Council, 2020b).

### Disinfection of Equipment

The use of materials that do not pose a risk of contagion and that can be easily disinfected, the availability of individual equipment and the disinfection of equipment before and after each use were measures promoted by the PE protocols in the new normal (COLEF Council 2020a; PHE-EPS Canada, 2020), and this is shown in table 3, where 94.1% of teachers stated that the equipment was subjected to a disinfection process, with the most common time to do so being after use (63.6%). Pupils' involvement in the task of disinfecting equipment was higher in secondary school (49.1%) than in primary school (3.4%), probably due to their older age and maturity.

COPLEFC (2020) proposed to establish a place to accommodate students with sufficient water-alcohol dispensers, and space to leave clothes and backpacks with sufficient distance to avoid overcrowding.

### Support Received

Table 4 shows that 25.2% of primary school teachers rated the help received from their school's management team as the highest, compared to 16.3% of secondary school teachers. We sense that this result reflects the more collegial work done in primary schools. However, secondary school teachers valued the document produced by COPLEFC (2020) more positively, which was focused on this educational stage, and which probably helped them to incorporate more changes in teaching and learning activities.

### Conclusions

In relation to the first objective of the study, to determine the level of changes introduced in the different educational processes, the PE Barometer has shown that the main modifications have been linked to teaching and learning activities and the specification of curricular content for compliance with the protocols of physical distancing, sanitation and use of the material. In this context, the prioritisation of curricular content has been a challenge for teachers. With regard to the second objective, to detect differences in the changes introduced according to educational level and type of school, the EF Barometer showed that there were no significant differences between teachers in public schools and those in private and subsidised schools, but there were significant differences between teachers in primary and secondary education, specifically in relation to changes made in teaching and learning activities and in interaction and communication with pupils through the use of technology.

With regard to the third objective of the study, that of perceived institutional support for the teaching task, it should be noted that the teaching staff reported having received little support from the education administration, but significant support from the management team of their respective schools, especially in primary education.

Finally, the methodological changes in post-pandemic teaching envisage a model of hybrid PE with greater technological presence (O'Brien et al., 2020; SHAPE America, 2020), where the TPACKPEC model fits perfectly as a reference framework (Monguillot et al., 2018), which relates technological, curricular and pedagogical knowledge in the classroom, as well as personal knowledge (emotions and motivations), given that the pandemic has led to the need to also address the emotional dimension of teachers and students (Román et al., 2020), opening the door to new lines of research.

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