Adaptations of music education in primary and secondary school due to COVID-19: the experience in Spain

Diego Calderón-Garrido and Josep Gustems-Carnicer

Department of Applied Didactics, University of Barcelona, Barcelona, Spain

ABSTRACT

COVID-19 caused an essential confinament in order to limit its expansion. Globally, this led to a reconsideration of education processes. The study's purpose is to analyse how compulsory education music teachers in Spain adapted. To gather the data, 335 teachers were surveyed. The participants preferred to continue teaching in most cases. However, this situation forced them into an adaptation in which preference was given to contemplative activities. These adaptations were marked by a lack of methodological and material resources. A common complaint was the lack of specific instructions from government bodies. In addition, a difference was observed between public, private and semi-private schools. Interestingly, the teachers considered that the situation had enabled them to have more contact with students, even though the learning was asynchronous.

Introduction

COVID-19 is a virus that caused a global pandemic. Due to the lack of vaccines and effective drugs and given the alarming increase in the number of deaths caused, many countries adopted drastic lockdown measures to limit the reach of the virus and slow down the pandemic (Byass 2020). In the education field, by the end of April 2020, schools were closed in 180 countries and over 85% of students worldwide were not presently attending their classes (The World Bank 2020). In Spain, where this study was undertaken, the entire population was in lockdown and education institutions at all levels, including early childhood, primary, secondary and university, were affected for several months, at least as far as buildings are concerned.

This sudden closure forced schools and their teaching staff to act to alleviate the academic impact as much as possible. The perfect way to continue the academic year was online, with computers, tablets and smartphones as the main resources. In any case, Online education should be differentiated from *emergency remote teaching* as a reaction to the situation caused by COVID-19 (Hodges et al. 2020). Online teaching and remote emergency teaching ideally depend on digital technology. However, in the first case, the teacher is interested in the possibilities and benefits that digital technology offers (Crawford 2017). In the second case, teachers are forced to reinvent themselves, without previous preparation. In this second situation, serious concerns could arise from the outset about the possibility of adapting music education to a computer-mediated system, due to the many considerable technological difficulties that it involves, and limited music teachers' digital skills for teaching, and even the lack of importance of music in the Spanish school curriculum (Aróstegui 2016).

However, the immediacy of the lockdown in Spain meant that neither families nor teaching staff had gathered any of the required material or carried out any preparations (Diez-Gutierrez and Gajardo-Espinoza 2020). Despite previous educational projects and investments (FEDER 2019), in many cases digital technology was rediscovered as an ally in the teaching-learning process (Chamarro 2020) that could help in this situation. Meaning, after an initial period of confusion, in which contents, materials and methodologies were reorganised, teachers and students managed to systematize working conditions so that the academic year could be completed. However, the results depended largely on the investment in information and communication technology (ICT), teacher training, and the platforms that were established and known to teaching staff (Hebebci, Bertiz, and Alan 2020). All these factors varied widely in public, private or semi-private schools.[1] Hence, a social divide became apparent, with some students needing the collaboration of many stakeholders to try to mitigate problems of inclusion and equity during the pandemic (Doucet et al. 2020). These social differences were not only between the schools themselves but between the students from the same school. Beyond the obvious necessity of accessing the internet and electronic devices, the health crisis emphasised that the collaboration and involvement of families are required to ensure the right to education (Muñoz and Lluch 2020). Neither society nor educational infrastructures were ready for as long a lockdown as that which took place. Decisions were made in favour of a digital transformation that was insufficiently supported by a cultural transformation within educational institutions (Neira 2020).

This situation tested teachers' knowledge and their use of digital technology. The most widely used model to assess and reflect on teachers' digital knowledge is TPACK (technological, pedagogical content knowledge) proposed by Mishra and Koehler (2006). This model identifies three types of knowledge that interact and mutually influence each other: content, pedagogy and technology. Hence, the remote education brought into play not only each teacher's knowledge of their discipline, but also their digital skills for teaching. On the other hand, regarding the use, the SAMR model compares the use of digital technology with past teaching practice. In this model, Puentedura (2015) proposed four levels to assess the use of digital technology: substitution, augmentation, modification and redefinition. The first two levels (substitution and augmentation) are enhancement steps and represent the use of digital technology in existing learning activities. The last two levels (modification and redefinition) are considered transformation steps. In them, the learning activity is facilitated by technology to the extent that it may not have existed or been possible before the availability of a certain technology. In the case of making use of digital technology in music education, it seems logical to think that it is a question of overcome tiers according to educational needs, in order to move from enhancement to transformation (Bauer and Mito 2017). In this sense, for example, Internet has given music teachers the opportunity to carry out creative processes to work within the classroom (Cayari 2018). With regards to the possibilities of digital technologies, the Technology Institute for Music Education (TI:ME 2019) proposed six areas where it could be applied to education: (1) Electronic Musical Instruments; (2) Electronic Music Production; (3) Computer Music Notation; (4) Music Instruction Software; (5) Multimedia Development; (6) Productivity Tools, Classroom and Lab Resources.

Despite this, although music education has benefited from the use of digital technology in various stages and contexts (Calderón-Garrido et al. 2019), some researchers have indicated that the use of technology has been limited to reinforcing traditional contents. Consequently, some of the possibilities that technology offers have not been explored (Crawford and Southcott 2017).

Music education is one of the subjects in the Official Spanish Curriculum for primary and secondary education (Casanova and Serrano 2018). The current legislation establishes three main blocks in music education: listening, musical performance and creativity. The rest of the curriculum contents are organised and defined around these three blocks (Jefatura del Estado 2014, 2015). Therefore, contents such as musical language or musical styles, can be worked on in all three blocks.

About the emotional aspect is concerned, during the COVID-19 lockdown, it was to be expected that both teachers and students would feel many emotions, particularly 'negative' emotions

stemming from threatening events and those in which losses occur (Posner, Russell, and Peterson 2005). The main negative emotions in this case would be fear, anger, nervousness and sadness, all as a result of the global health crisis that was experienced (Canet-Juric et al. 2020). At the same time, in parallel and in response, many 'positive' emotions were experienced due to the greater amount of time spent as a family and the period of reflection (Brooks et al. 2020). Combining the two types of emotional states could generate confusion and a certain amount of uncertainty. It is here that music and music education, with its capacity to help regulate emotions (Calderón-Garrido et al. 2020), could act as an effective mediator in case teachers would want to take advantage of this.

In short, COVID-19 represented both an opportunity and a threat for music education. Thus, the question that has guided this research was to know what the experiences of music teachers in Spain during the confinement caused by a global pandemic have been. Consequently, the aim of this research was to find out which content blocks primary and secondary school music teachers in Spain taught most frequently during the lockdown, what adaptations they had to make, the actions carried out with regard to emotional regulation, and what their opinions are on the strengths, weaknesses, threats and opportunities of this situation. We differentiated between sex, age, educational level, ownership of the schools and ICT training.

Methodology

To meet the objective, an online, ad hoc questionnaire was created and administered. The first draft was designed based on relevant literature on music education, online teaching and the use of educational technology. The areas of music didactics specified in the Official Spanish Curriculum for Primary and Secondary Education were also taken into account. Afterwards, it was evaluated and modified by a panel of five experts in music education, using the Delphi method (Somerville 2008). They were a music teacher in elementary school, a music teacher in high school, and three music teachers in university, all of them with more than ten years of expertise. The Delphi method was used to reach a decision in the research instrument by interviewing five experts. They answered three rounds of test questionnaires, and the answers were added and shared with the group after each round. In this process, a Cohen's Kappa value of .87 was obtained. The final questionnaire contained 54 questions on four dimensions (Communication between teachers and students; Teaching and evaluation of contents; Advantages and disadvantages of *emergency remote teaching* in music education; Advantages and disadvantages of *emergency remote teaching* for music teacher). The questionnaire consisted of dichotomous questions, multiple choice questions and open-ended questions. It was administered using the Formsite platform and a 15-day period was established for replying. This period was decided by the investigators and communicated to the informants. The sample was accessed through the email of the schools, as well as the different social networks. We made sure there was a sample of all the Spanish territory. At all times, the researchers followed the principles of the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research 1978) and their university's Code of Good Research Practices (University of Barcelona 2010). This study was approved by the ethics committee of the University of Barcelona in April 2020.

The results were gathered and analysed using the IBM Statistic Package for Social Science programme, version 21.0. In addition to the usual statistics for a basic analysis, the Mann–Whitney test (for two nonparametric variables), Kruskal–Wallis test (for more than two nonparametric variables) tests and Chi-square test (for frequency data) were used to know the statistical differences. Prior to this, the Kolmogorov–Smirnov (with Mann–Whitney) or Shapiro–Wilk (with Kruskal–Wallis) normality tests were performed on the sample as required, as well as Levene's test to check the equality of variance in all the cases. For the answers to the open questions, a qualitative analysis was carried out using ATLAS.Ti software, version 1.5.2. For the analysis, the independent variables were gender, type of centre and academic cycle. The dependent variables were those referred to the four exposed dimensions: Communication between teachers and students, Teaching

and evaluation of musical contents, Advantages and disadvantages of *emergency remote teaching* in music education, and Advantages and disadvantages of *emergency remote teaching* for music teacher.

Once all the responses had been gathered, incomplete questionnaires were eliminated ($n = 28$) as well as those in which the teachers stated that they had not been able to contact pupils ($n = 9$). Therefore, the final sample was comprised of 335 teachers: 257 women (76.7%) and 78 men (23.3%). The mean age of the participants was 42.35 years (SD = 10.212). A total of 240 teachers (71.6%) worked in a primary school and 95 (28.4%) worked in a secondary school. In total, 277 (82.7%) were employed in a public institution and 58 (17.3%) in a semi-private or private institution. Teachers had a mean of 16.86 years (SD = 10.109) of teaching experience. The reliability of the responses obtained was good (Cronbach's Alpha = .837).

Results and discussion

Communication between teachers and students

The teachers stated that they were able to maintain contact with students during the lockdown, although in different ways. Most teachers held online meetings using an application provided by the school, followed by an application that was not provided by the school but all staff agreed on, applications that teachers sought on their own initiative that met their needs or telephone calls. Finally, 84 teachers made contact using other asynchronous systems, including emails, school platforms such as DINANTIA, the school's virtual campus, or by sending videos. The Chi-square test reported a statistical difference between public and semi-private or private schools. For example, the use of applications provided by the school itself was much more common in semi-private or private schools (52.3% vs. 35.1%). Table 1 shows these data. These data highlight the central role that videoconference platforms have played, in an attempt to endure the situation with the greatest possible normality, and for students to stay in synchronous contact with each teacher.

As a discussion, the need for resources to maintain the teaching/learning process led to the generation of many platforms containing a range of educational resources, such as UNESCO's 'Distance learning solutions' (2020) at international level or INTEF's 'Online learning resources' (2020) in Spain. The difference between public, private and semi-private schools reveals the insufficient investment made in public schools. Although the ERDF (2019) report describes investments of up to 427 million euros to improve these infrastructures in the 16 previous years, this amount is insufficient. In reality, it does not represent more than 2 euros per student per year (Palomares 2019).

Regarding the contact with students, the most common frequency both synchronously and asynchronously was once a week, followed by daily communication, twice a week, once every two weeks and once a month (4.8%). Chi-square test reported a statistical difference according to student level.

Table 1. Contingency table of contact with students and differences according to school, using Chi-square test.

		School		
	Total responses	Public ($n = 277$)	Non public ($n = 58$)	Statistical differences
App provided by the school	129 (38.5%)	97 (35%)	32 (55.2%)	$X^2_{(1,335)} = 5.059$ $p = .024$
App not provided, but still used	77 (23%)	60 (21.7%)	17 (29.3%)	$X^2_{(1,335)} = 1.221$ $p = .269$
Own initiative	38 (11.3%)	36 (13%)	2 (3.4%)	$X^2_{(1,335)} = 3.854$ $p = .050$
Telephone calls	7 (2.1%)	5 (1.8%)	2 (3.4%)	$X^2_{(1,335)} = .620$ $p = .431$
Other	84 (25.1%)	79 (28.5%)	5 (8.6%)	$X^2_{(1,335)} = 7.574$ $p = .006$

In primary school, contact once a week or twice a week was the most common, while in secondary school, contact was commonly once a week or even daily. Table 2 shows these data. The analysis of responses showed that teachers who communicated with their students every day usually did this asynchronously.

Teaching and evaluation of contents

Table 3 shows the general teaching of content blocks, according to educational stage.

Below are the results of the open responses regarding the seven content blocks (creativity and exploration, perception and listening, musical language, musical styles, playing and instrument, singing and physical expression).

With regard to open questions about teaching contents related to creativity and exploration, teachers who taught these contents described the adaptations made to each activity. For example: 'The proposals I made to my students were to create songs, rhythms, dances, etc. Adaptations were needed for each one of the contents by making video tutorials' (Respondent 29). In many cases, teachers made 'adaptations to material that all students have at home: metal, wooden and plastic cooking spoons, etc.' (Respondent 257). In some cases, technological resources for music were used, such as 'MuseScore so that students could write their own melodies' (Respondent 301).

Regarding perception and listening activities, a clear inclination was found for the perception of home soundscapes and for 'online sound recognition games, videos for following rhythms and listening to songs on YouTube' (Respondent 105).

As far as musical language concerns, most adaptations refer to videos made by teaching staff, with a particular focus on rhythmic aspects. For example, Respondent 162 stated that he had 'done body percussion exercises guided by videos that I created for each exercise'. In addition, the use of existing resources was detected, particularly videos that were already on YouTube.

Teachers who continued to teach music styles often did this with other content blocks and particularly with 'listening that you can use to work on style' (Respondent 201). In addition, students' independent learning was detected 'through research assignments on genres and artists, based on their interests and leading to other genres' (Respondent 80).

The area of playing an instrument reached a standstill to a certain extent. One teacher said: 'I sent YouTube videos that seemed interesting, but without advancing in difficulty' (Respondent 321). In reference to progress, another teacher stated that there was 'very little, creating accompaniments and practicing at home. The result is much less!' (Respondent 15). In any case, the most common method was the use of asynchronous video with individual performances, sent by the teacher to the student and vice versa.

Video was also the preferred medium for singing, but it was a little more complicated than playing an instrument as 'I have sent them proposals to sing songs, but it is difficult to receive videos

Table 2. Contingency table of frequency and differences by educational stage, using Chi-square test.

		Educational stage		
	Total responses	Primary ($n = 240$)	Secondary ($n = 95$)	Statistical differences
Daily communication	73 (21.8%)	43 (17.9%)	30 (31.6%)	$X^2_{(1,335)} = 5.830$ $p = .016$
Twice a week	66 (19.7%)	44 (18.3%)	22 (23.2%)	$X^2_{(1,335)} = .804$ $p = .370$
Once a week	143 (42.7%)	106 (44.2%)	37 (38.9%)	$X^2_{(1,335)} = .434$ $p = .510$
Once every two weeks	37 (11%)	33 (13.8%)	4 (4.2%)	$X^2_{(1,335)} = 5.608$ $p = .018$
Once a month	16 (4.8%)	14 (5.8%)	2 (2.1%)	$X^2_{(1,335)} = 1.981$ $p = .159$

Table 3. Contingency tables of content blocks taught and differences by educational stage, using Chi-square test.

		Educational stage		
	Total affirmative responses	Primary ($n = 240$)	Secondary ($n = 95$)	Statistical differences
Creativity and exploration	240 (71.6%)	169 (70.4%)	71 (74.7%)	$X^2_{(1,335)} = .447$ $p = .504$
Perception and listening	291 (86.9%)	209 (87.1%)	82 (86.3%)	$X^2_{(1,335)} = .040$ $p = .841$
Musical language	211 (63%)	150 (62.5%)	61 (64.2%)	$X^2_{(1,335)} = .167$ $p = .683$
Musical styles	208 (62.1%)	136 (56.7%)	71 (74.7%)	$X^2_{(1,335)} = 4.572$ $p = .033$
Playing an instrument	159 (47.5%)	102 (42.5%)	57 (60%)	$X^2_{(1,335)} = 5.340$ $p = .021$
Singing	168 (50.1%)	134 (55.8%)	34 (35.8%)	$X^2_{(1,335)} = 4.616$ $p = .032$
Physical expression	185 (55.2%)	157 (65.4%)	28 (29.5%)	$X^2_{(1,335)} = 14.489$ $p < .001$

because some students are embarrassed to sing and record themselves' (Respondent 287). In most cases, students were only asked for individual video performances. However, some synchronous proposals were found, particularly relating to 'doing vocal work routines' (Respondent 299).

Video was also the main resource in physical expression, including videos created by teachers, existing ones or a combination of both. For example, one teacher stated that 'we proposed dances based on YouTube videos or some proposals that I created, and they sent me their versions by video' (Respondent 254).

As a discussion of these results, in most cases, music contents continued to be taught. However, the activities that were proposed reflect the adaptation to *emergency remote teaching* described by Hodges et al. (2020), such as the use of existing YouTube videos or the creation through virtual applications for which neither teachers nor students had received prior training. The use of digital technology was presented as a solution to a specific situation, but with no prior consideration. As Ju, Yon, and Hee (2016) described, it was affected by each teacher's attitude, training and degree of acceptance of ICTs. If the SAMR model is applied (Puentedura 2015), the activities that teachers proposed would be at the lowest level of all, that of substitution.

It should be considered that some contents like singing, playing an instrument and physical expression in primary and secondary education are generally carried out in a group. In theory, this is a handicap when teaching is limited to certain web platforms. An effort of imagination is required to continue to teach these contents online. During COVID-19, many experiences were based on watching videos in which, asynchronously, the teacher explained specific contents that were then reinforced with a listening activity. This contemplative experience was sometimes accompanied by other videos in which the teacher performed a work, with particular emphasis on the difficulties it involved. This has been common in all areas of knowledge (Guo and Li 2020). In music education, one of the most used resources is video (Bautista et al. 2019), as a complement (Roach 2013). However, its use as the backbone of the education process, for example in the flipped classroom, where the students watch videos at home with theoretical content, reserving time in the classroom for practical activities. In these videos it is recommended that the protagonist is the teacher (Blasco, Lorenzo, and Sarsa 2016).

The statistical differences were of interest, particularly the reduction of singing and dance related activities in secondary education. This could be due to the students' age and the shyness that comes with adolescence. In this stage, it is less likely that students want to sing or dance in the classroom (Freer 2015), and even harder to record performances on video for their subsequent evaluation, as in lockdown. Therefore, it seems logical to consider that teachers considered this battle lost and concentrated on other contents, to ensure that students would participate.

Regarding interdisciplinary teaching, a total of 55.2% of music teachers did not carry out interdisciplinary teaching with another teacher from other areas, whether related (such as physical education or visual and plastic education) or not. Although there is a high percentage of teachers who did work in an interdisciplinary way, this could illustrate the teachers' lack of previous preparation. It is a problem if considering the little time devoted to music education where such interdisciplinarity seemed a good solution. Also, digital technology provides opportunities for interdisciplinary teaching in art education (Madden et al. 2013), but these opportunities to carry out activities that include other areas of knowledge were not taken. The Mann–Whitney test reported a statistical difference was in these results depending on educational stage ($z = -3.919$; $p < .001$). Interdisciplinary work was much more common in primary education than in secondary (50% vs. 27.4%, respectively). This could be due to the fact that project work tends to be more common in primary school. Therefore, and as concluded in the previous research of Ramírez et al. (2017), primary school teachers and pupils appear to be more sensitive to these interactions.

Almost all responses to the open questions about interdisciplinary teaching with other teachers focused on areas of interest and coordination of activities, such as 'another art teacher prepared a special blog *EMOZIO-ARTE*. Coordinated activities and days to send these activities' (Respondent 4), or Respondent 35 who stated 'we have created songs for language and math lessons. And with art, through the creation of instruments, or physical education, through dance and body percussion', or 'using our own proposals to interrelate the area of music with that of the visual arts (drawings to become familiar with a certain musical language, animated musicograms, etc.)' (Respondent 91). Therefore, interdisciplinary work with related areas, or the search for cross-disciplinary factors, for common benefit (Jensen 2019), was one potential solution to the lack of importance of music education in the curriculum.

Advantages and disadvantages of emergency remote teaching in music education

A total of 61.8% of teaching staff considered that there were no advantages to working online. The Mann–Whitney test reported a statistical difference depending on the educational stage ($z = -2.751$; $p = .006$). The majority of primary school teachers (67.5%) considered that there were no advantages, but this was not so clear in secondary schools, where 49.5% of teachers considered that online work did have advantages, such as that students who wanted to have access to more information or have more contact with the music teacher, even if it was asynchronous, they could do it. The Mann–Whitney test reported a statistical difference depending on the sex of the teacher ($z = -3.700$; $p < .001$). A total of 66.9% of female teachers considered that there were no benefits in teaching contents online, while 59% of male teachers did consider that there were benefits. These data confirm a gender gap that exists in the valuation of digital technology in education already described by Suki (2011).

Some of the advantages mentioned by teachers in open questions referred to organisation and the opportunity for students to work longer on music than they would in normal teaching. For example, one teacher stated that 'students have the proposed activities all the time, and some may spend more than an hour a week on the music class' (Respondent 3). Therefore, teachers were able to have a greater contact with the students who were more interested in the subject, even if this were only through asynchronous means. Indeed, for the teachers, this was an advantage due to the little importance given to music education in the curriculum (Aróstegui 2016), which translates to between 45 and 90 min of class a week (Jefatura del Estado 2014, 2015). Also, as an advantage, some teachers referred to family communication due to music. For example, Respondent 146 stated that 'many activities, mainly musicograms and dances, were carried out with siblings and parents. A task of family cooperation that was very nice and interesting'. It seems logical that music was able to help foster family relationships in a period in which family contact was so intense, because music has always strengthened family bonds.

On the other hand, great concern was expressed about how to cover contents that students could not work on during lockdown. Teachers were awaiting instructions from government bodies and referred to a lack of programming in this respect. Some respondents even said that 'I cannot think about that yet, the day to day is enough effort as it is' (Respondent 261). Many teachers showed little concern about the interpersonal skills that their students could not develop that are normally gained through music. This may indicate excessive individualism, to the detriment of collective music during lockdown. Also, the majority (82.7%) considered that online assessment was not beneficial. Only 58 teachers (17.3%) thought that it was advantageous. In the open questions, teachers shared ideas about student self-assessment or stated that they would only use the data obtained during this period to increase grades, because of students' personal situations or because 'the content could have been produced by a family member' (Respondent 174). In some cases, concerns were expressed about how to contact families with the evaluations, as some families had problems accessing digital technology. This was stated by Respondent 14:

> We are looking at how to do this. Most families do not use email. We have considered the possibility of sending them by normal post. But the Ministry of Education has not given us clear guidelines. So, we don't know what we will do.

As a discussion, this comment reflects the lack of instructions given by the relevant government bodies, as well as the lack of previous preparation. This happens although distance learning has been established for some years, particularly in university environments, and assessment and feedback systems have been tested (Dominguez 2011). We should be able to extrapolate these experiences to other academic stages and knowledge areas. Indeed, ICTs have been found to be great allies in the shift to competence-based assessment, providing solutions for teachers in this change in evaluation paradigm (Rodríguez 2005).

Regarding emotional aspects of teaching and learning, these were of excessive importance to the teachers in this study. Most teaching staff (60.6%) saw the need to have an impact on emotional aspects in their classes, regardless of the educational stage at which they teach. In the open questions, teachers took into account the situation, and as indicated by Respondent 321, they worked 'with awareness of the fun, happy moments experienced with family members when carrying out the proposed music activities', or 'proposed various activities on the impact of music during lockdown, and proposed activities on the unconscious use of music. On music and emotions' (Respondent 16). Referring again to the benefits of music in the management and intensity of family relations, and the emotional states that a person may experience during a global pandemic, it should be remembered that music is closely linked to the emotions and well-being of those who play and those who listen (Calderón-Garrido et al. 2018). It is therefore gratifying that music teachers tried to help alleviate the anxiety caused by the situation.

Advantages and disadvantages of emergency remote teaching for music teachers

In regard to disadvantages, most teachers (77.6%) considered that the *emergency remote teaching* did not represent a threat. However, some answers in the open questions about it showed uncertainty about the future and the area of music education. For example, Respondent 3 was constantly 'concerned that, with the changes that would have to be made if the situation occurred again, the subject of art/music would be further undermined (by reducing the number of hours)'. In addition, some teachers had concerns about staff recruitment processes: 'my situation of claiming a vacant post as a supply teacher[2] could be withdrawn or overlooked due to lack of relevance in the current situation' (Respondent 91). Others were directly concerned about their lack of skills: 'I do not have a command of technologies' (Respondent 70).

In any case, most teachers, 75.8%, considered that the situation was not advantageous to them. The Kruskal–Wallis test reported a statistical difference according to age ($X_4^2 = 23.639$; $p < .001$).

Thus, the older the teacher, the fewer advantages were found. As a discussion, these data confirmed the generational gap found in the valuation of digital technology in education (Lamschtein 2010).

For some teachers, the digital skills they developed were an advantage. They stated in the open questions that 'we have learnt to use many apps that we did not know about before' (Respondent 10). Some teachers discussed future changes and whether 'reducing the number of students per class would require more teachers and it would be easier to get a position' (Respondent 113). Furthermore, and as stated in the NMC Horizon Report (2017), the need for continuous training in the use of ICT should not be overlooked to ensure technology is used properly.

The majority of teachers (69.8%) considered that investments in schools would be reconsidered as a result of problems detected due to lockdown. The Mann–Whitney test reported a statistical difference between public and semi-private or private schools ($z = -2.225$; $p = .026$). A much higher percentage of teachers from semi-private or private schools than teachers from public schools (82.7% vs. 67.1%) considered that investments would be reconsidered. There were clear concerns about this issue:

> if the idea is to continue this way in the next academic year, a great investment must be made in technology equipment. This also applies to us, as we are working with our own resources, which in most cases are precarious or obsolete. (Respondent 314)

This reflects a common complaint in music education about the lack of equipment in classrooms, particularly in public schools (Crawford 2013).

A total of 90.1% of teachers considered that they had learnt something through working online. Their answers were focused on the development of teaching skills, constant reflection on the need for face-to-face teaching in music education, the existence of a social divide among students that meant not everyone could take the online classes equally, and the need for support, not just for students but for the entire family. However, in reference to the TPACK model (Mishra and Koehler 2006) and observing teachers' statements and use of digital technology, the development of digital competence for teaching was limited to the aspect of communication and a few specific resources. The social divide detected among students corroborates the findings of Doucet et al. (2020).

Most teachers (94.6%) said that they had missed something during lockdown, such social relationships or face-to-face music teaching, while 18 (5.4%) teachers did not miss anything. These findings were independent of sex or the stage in which the classes were taught. Some teachers highlighted the 'human warmth and relationships that are formed at school. Both with colleagues and with the children' (Respondent 71). One teacher stated: 'I felt totally abandoned by the government' (Respondent 270). As for the discussion of these data, with regard to interpersonal relations, the intensive use of digital technology is associated with social distancing caused by additions to technology and social networks, which could also lead to technology stress (Cuervo-Carabel et al. 2020) or even technophobia (Daruwala 2020) due to overuse.

Conclusions

COVID-19 and the situation it has caused have threatened institutions and social relations. Inevitably, education has undergone a stress test that it has passed with relative success, especially if we consider the devastating scenarios that emerged in the uncertainty of the first days. In Spain, primary and secondary music teachers suffered from this initial uncertainty produced by what has been called *emergency remote teaching*. As shown by the results, the greatest findings are related to the situation was marked by a lack of methodological and instrumental preparation that led to adaptation of activities to replace normal teaching. In the adaptation carried out, group activities, teacher-pupil interaction, playing an instrument and singing were replaced by videos and perceptive and contemplative activities such as the visualisation of concerts or the listening of selected musical fragments by the teachers, as well as families' involvement in group suggestions. It is especially important, but at the same time paradoxical that, considering the little importance

that music education is given in the Spanish curriculum, some teachers have been in more contact than ever with students, even if this contact was asynchronous.

A future full of uncertainties is opening up, in which education will be restructured. In general, music and art have been essential to provide support in the anxious times we have experienced. This seems to contradict the marginalisation of music in the school curriculum because society has needed and claimed for these artistic activities to encourage music education. However, we do not know whether music education will face more tests like the one we have overcome recently. If it does, the lack of resources and training for teachers cannot happen again. This requires adaptation of initial and in-service teacher training with regards to the use of educational technology and the development of digital competence. It is in our hands to adapt methodology and rethink assessment systems. It is in authorities' hands to provide the necessary resources for music education. It's up to everyone to guarantee quality music education, whatever the situation in which it is taught.

Notes

1. In Spain there are three types of education schools, classified by ownership: public (whose owner is the state), private (privately owned) and semi-private (privately owned, but mainly maintained by public funds and some private capital).
2. *Supply teacher* refers to the recruitment of a lecturer by the government to fill a vacancy temporarily.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The authors received no financial support for the research, authorship and/or publication of this article.

Notes on contributors

Diego Calderón-Garrido is Serra Húnter Felllow at the University of Barcelona, Faculty of Education. PhD in Education Technology and PhD in History of Art. His research interests include educative technology and music education. Email: dcalderon@ub.edu Pg. Vall d'Hebron 171, ed. Llevant 3a planta, 08035 Barcelona (Spain).

Josep Gustems-Carnicer is tenured university lecturer at the University of Barcelona, Faculty of Education. PhD in Education. His research interests include teacher training and music education. Email: jgustems@ub.edu Pg. Vall d'Hebron 171, ed. Llevant 3a planta, 08035 Barcelona (Spain).

ORCID

Diego Calderón-Garrido http://orcid.org/0000-0002-2860-6747
Josep Gustems-Carnicer http://orcid.org/0000-0002-6442-9805

References

Aróstegui, J. L. 2016. "Exploring the Global Decline of Music Education." *Arts Education Policy Review* 117 (2): 96–103. doi:10.1080/10632913.2015.1007406.

Bauer, W. I., and H. Mito. 2017. "ICT in Music Education." In *The Routledge Companion to Music, Technology, and Education*, edited by A. King, E. Himonides, and S. A. Ruthmann, 91–102. New York: Routledge.

Bautista, A., C. Tan, J. Wong, and C. Conway. 2019. "The Role of Classroom Video in Music Teacher Research: A Review of the Literature." *Music Education Research* 21 (4): 331–343. doi:10.1080/14613808.2019.1632278.

Blasco, A., J. M. Lorenzo, and J. Sarsa. 2016. "La clase invertida y el uso de vídeos de software educativo en la formación inicial del profesorado. Estudio cualitativo." *@tic. revista d'innovació educativa* 17: 12–20. doi:10.7203/attic.17.9027.

Brooks, S. K., R. K. Webster, L. E. Smith, L. Woodland, S. Wessely, N. Greenberg, and G. J. Rubin. 2020. "The Psychological Impact of Quarantine and How to Reduce It: Rapid Review of the Evidence." *The Lancet* 395: 912–920. doi:10.1016/S0140-6736(20)30460-8.

Byass, P. 2020. “Eco-epidemiological Assessment of the COVID-19 Epidemic in China, January–February 2020.” *Global Health Action* 13: 1760490. doi:10.1080/16549716.2020.1760490.
Calderón-Garrido, D., P. Cisneros, I. García, and R. de las Heras. 2019. “La tecnología digital en la educación musical: una revisión de la literatura científica.” *Revista Electrónica Complutense De Investigación En Educación Musical - RECIEM* 16: 43–55. doi:10.5209/reciem.60768.
Calderón-Garrido, D., J. Gustems-Carnicer, C. Martín-Piñol, C. Fuentes-Moreno, and A. Portela-Fontán. 2020. “Emociones en la experiencia artística: claves para el desarrollo educativo y social.” *Artseduca* 25: 85–101. doi:10.6035/Artseduca.2020.25.5.
Calderón-Garrido, D., C. Martín Piñol, J. Gustems-Carnicer, and A. Portela-Fontán. 2018. “La influencia de las Artes como motor de bienestar: un estudio exploratorio.” *Arte, Individuo y Sociedad* 30 (1): 77–93. doi:10.5209/ARIS.56350.
Canet-Juric, L., M. L. Andrés, M. Del Valle, H. López-Morales, F. Poó, J. Galli, M. Yerro, and S. Urquijo. 2020. “A Longitudinal Study on the Emotional Impact Cause by the COVID-19 Pandemic Quarantine on General Population.” *Frontiers in Psychology* 11: 2431. doi:10.3389/fpsyg.2020.565688.
Casanova, O., and R. M. Serrano. 2018. “La educación musical en el actual currículo español. ¿Qué formación recibe el alumnado en la enseñanza Primaria?” *Revista Electrónica Complutense de Investigación en Educación Musical* 15: 3–17. doi:10.5209/RECIEM.54844.
Cayari, C. 2018. “Conecting Music Education and Virtual Performance Practices from YouTube.” *Music Education Research* 20 (3): 360–376. doi:10.1080/14613808.2017.1383374.
Chamarro, A. 2020. “Psychosocial Impact of COVID-19: Some Evidence, Many Doubts to be Clarified.” *Aloma* 38 (1): 9–12. https://n9.cl/bm63.
Crawford, R. 2013. “Evolving Technologies Require Educational Policy Change: Music Education Form the 21st Century.” *Australasian Journal of Educational Technology* 29 (5): 717–734. doi:10.14742/ajet.268.
Crawford, R. 2017. “Rethinking Teaching and Learning Pedagogy for Education in the Twenty First Century: Blended Learning in Music Education.” *Music Education Research* 19 (2): 195–213. doi:10.1080/14613808.2016.1202223.
Crawford, R., and J. Southcott. 2017. “Curriculum Stasis: the Disconnect Between Music and Technology in the Australian Curriculum.” *Technology, Pedagogy and Education* 26 (3): 347–366. doi:10.1080/1475939X.2016.1247747.
Cuervo-Carabel, T., I. Meneghel, N. Orviz-Martínez, and S. Arce-García. 2020. “Nuevos retos asociados a la tecnificación laboral: el tecnoestrés y su gestión a través de la Psicología Organizacional Positiva.” *Aloma* 38 (1): 21–30. https://shorturl.at/CD679.
Daruwala, N. 2020. “Generation Lockdown: Exploring Possible Predictors of Technology Phobia During the Coronavirus Self-Isolation Period.” *Aloma* 38 (1): 15–20. https://shorturl.at/bjrRS.
Diez-Gutierrez, E., and K. Gajardo-Espinoza. 2020. “Educar y Evaluar en Tiempos de Coronavirus: la Situación en España.” *Multidisciplinary Journal of Educational Research* 10 (2): 102–134. doi:10.4471/remie.2020.5604.
Dominguez, D. 2011. “Conceptualización y prospectiva de los mundos virtuales como escenarios formativos.” *Revista Española de Pedagogía* 249: 305–322.
Doucet, A., D. Netolicky, K. Timmers, and F. J. Tuscano. 2020. *Thinking About Pedagogy in an Unfolding Pandemic*. Paris: UNESCO. https://n9.cl/fch4s.
FEDER. 2019. *FEDER y red.es: 16 años de alianza para impulsar la modernización de la Educación a través de las TIC*. Madrid: Gobierno de Espana. https://shorturl.at/jltB3.
Freer, P. 2015. “Perspectives of European Boys About Their Voice Change and School Choral Singing: Developing the Possible Selves of Adolescent Male Singers.” *British Journal of Music Education* 32 (1): 87–106. https://doi.org/10.1017/S026505171400031X.
Guo, B., and H. Li. 2020. “Guidance Strategies for Online Teaching During the COVID-19 Epidemic: A Case Study of the Teaching Practice of Xinhui Shangya School in Guangdong, China.” *Science Insights Education Frontiers* 5 (2): 547–551. doi:10.15354/sief.20.rp020.
Hebebci, M. T., Y. Bertiz, and S. Alan. 2020. “Investigation of Views of Students and Teachers on Distance Education Practices During the Coronavirus (COVID-19) Pandemic.” *International Journal of Technology in Education and Science* 4 (4): 267–282. doi:10.46328/ijtes.v4i4.113.
Hodges, C., S. Moore, B. Lockee, T. Trust, and A. Bond. 2020. “The Difference Between Emergency Remote Teaching and Online Learning.” *Educause Review*. https://n9.cl/5o8n
INTEF. 2020. *Recursos para el aprendizaje en línea*. Madrid: Ministerio de Educación y Formación Profesional. https://n9.cl/cq7b.
Jefatura del Estado. 2014. “Real Decreto 126/2014, de 28 de febrero, por el que se establece el currículo básico de la Educación Primaria.” *Boletín Oficial del Estado* 52: 1–58. https://n9.cl/oief.
Jefatura del Estado. 2015. “Real Decreto 1105/2014, de 26 de diciembre, por el que se establece el currículo básico de la Educación Secundaria Obligatoria y del Bachillerato.” *Boletín Oficial del Estado* 3: 169–546. https://n9.cl/zvmo.
Jensen, J. B. 2019. “Music, Social Learning and Senses in University Pedagogy: An Intersection Between Art and Academe.” *Arts and Humanities in Higher Education* 18 (4): 311–328. doi:10.1177/1474022217732944.

Ju, Y., K. Yon, and N. Hee. 2016. "The Effects of Secondary Teachers' Technostress on the Intention to use Technology in South Korea." *Computers & Education* 95: 114–122. doi:10.1016/j.compedu.2015.12.004.
Lamschtein, S. 2010. *Las TICs y la brecha generacional*. Montevideo: Observatic. https://dspace.mides.gub.uy:8080/xmlui/handle/123456789/628.
Madden, M. E., M. Baxter, H. Beauchamp, K. Bouchard, D. Habermas, M. Huff, J. Pearon, and G. Plague. 2013. "Rethinking STEM Education: An Interdisciplinary STEAM Curriculum." *Procedia Computer Science* 20: 541–546. doi.10.1016/j.procs.2013.09.316.
Mishra, P., and M. Koehler. 2006. "Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge." *Teachers College Record* 108 (6): 1017–1054. https://n9.cl/7njs.
Muñoz, J. L., and L. Lluch. 2020. "Educación y Covid-19: Colaboración de las Familias y Tareas Escolares." *Revista Internacional de Educación para la Justicia Social* 9 (3): 1–17. https://n9.cl/0v6a.
National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. 1978. The Belmont report: Ethical principles and guidelines for the protection of human subjects of research. United States: Department of Health and Human Services. https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html.
Neira, P. 2020. "Entre el desconcierto y el asombro." In *Transformación en tiempos del COVID-19*, edited by R. Diez, 25–30. Lima: Universidad San Ignacio de Loyola.
NMC (New Media Consortium). 2017. "NMC Horizon Report: 2017 Higher Education Edition." *Educause*. https://n9.cl/gr0y.
Palomares, E. 2019. "¿Invertimos suficiente en Educación?" *NeCLO. Ciencia y Culutra al máximo*. https://n9.cl/ejwr.
Posner, J., J. A. Russell, and B. S. Peterson. 2005. "The Circumflex Model of Affect: An Integrative Approach to Affective Neuroscience, Cognitive Development, and Psychopathology." *Development and Psychopathology* 17 (3): 715–734. doi:10.1017/S0954579405050340.
Puentedura, R. R. 2015. SAMR: A brief introduction [blog post]. October 14. https://n9.cl/oemh.
Ramírez, V., R. Padial, B. Torres, J. Chinchilla, E. Ramírez, S. González, and C. González. 2017. "The Effect of a "PBL" Physical Activity Program-Based Methodology on the Development of Values in Spanish Primary Education." *Journal of Human Sport and Exercise* 12 (): 1310-1327. doi:10.14198/jhse.2017.124.17.
Roach, T. 2013. "The Friday Flip: New Methods to Increase Interaction and Active Learning in Eco-Nomics." *Social Science Research Network*, doi:10.2139/ssrn.2302.28.
Rodríguez, M. J. 2005. "Aplicación de las TIC a la evaluación de alumnos universitarios." *Teoría de la Educación. Educación y Cultura en la Sociedad de la Información* 6 (2), https://n9.cl/8itz.
Somerville, J. A. 2008. *Effective Use of the Delphi Process in Research: Its Characteristics, Strengths and Limitations*. Corvallis, OR. https://n9.cl/0vze.
Suki, N. M. 2011. "Gender, Age, and Education: Do They Really Moderate Online Music Acceptance?" *Communications of the IBIMA* 2011: 1–18. doi:10.5171/2011.959384.
The World Bank. 2020. *The COVID-19 Pandemic: Shocks to Education and Policy Responses*. The World Bank. https://n9.cl/cdd.
TI:ME. 2019. *Areas of Pedagogical Skill and Understanding (TAPSU)*. https://ti-me.org/index.php?option=com_content&view=article&id=2257&Itemid=1606.
UNESCO. 2020. *Distance Learning Solution*. Paris: UNESCO. https://n9.cl/l0xh.
University of Barcelona. 2010. *Code of Good Research Practices*. Barcelona: Edicions i Publicacions de la Universitat de Barcelona.