Distance learning environment: perspective of Italian primary and secondary teachers during COVID-19 pandemic

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Abstract

School closures because of the COVID-19 emergency forced a rapid transition to distance learning worldwide. In this study, we investigated teachers' experiences with distance learning during the first Italian lockdown. A sample of 270 primary and secondary teachers answered a semi-structured questionnaire administered between April and May 2020. Didactic modalities, students' and teachers' difficulties with distance learning, and teachers' feelings during school closure were investigated through open-ended questions. Content analysis indicated that most teachers adopted both synchronous and asynchronous modalities, which resembled the traditional classroom learning environment. Moreover, technological weaknesses (lack of proper digital equipment and poor digital skills) and lack of interactions appeared to be the main threats to the quality of distance learning. The implementation of distance learning in primary schools emerged as more challenging than in secondary education. Furthermore, most teachers experienced negative feelings during online teaching. However, 13% of the sample reported a sense of resilience and opportunity. Particularly, older teachers reported more resilience compared with younger teachers, indicating the importance of experience in managing stressful teaching events. Overall, findings suggest that—in this novel educational environment—teachers' role has changed significantly, placing strong emphasis on the ability to encourage communication, discussion, and contact with students. Future work should focus on how information and communications technology could sustain meaningful interactions between students and teachers, especially in primary education.

Keywords COVID-19 · Distance learning · Online learning · Primary school teachers · Secondary school teachers

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Introduction

The environment in which students learn significantly impacts their achievement as well as their well-being. In spring 2020, in response to the COVID-19 pandemic outbreak, governments worldwide adopted various preventive measures to contain infection risk among the population, which consequently strongly impacted the educational environment (Lauret & Bayram-Jacobs, 2021). For instance, by April 2020, 189 countries decided to close schools because of to the COVID-19 pandemic, affecting more than 1.5 billion children globally (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020a). Italy was one of the first European countries to experience a widespread outbreak of the virus and, as a result, school buildings fully closed from 23rd February 2020 until the end of the semester in June 2020 (Contini et al., 2021). School shutdown forced teachers and students to face a rapid transition from traditional in-person instruction to distance learning.

Distance learning is an umbrella term that groups all the teaching modalities that do not require the simultaneous physical presence of teachers and students in the classroom (Gurcan & Cagiltay, 2020; Moore et al., 2011). Nowadays, distance learning is usually conducted through the mediation of digital technologies that help both teachers and students to share information in different places or at different times. Synchronous distance learning involves real-time communication between teachers and students, while the asynchronous modality happens in delayed times and does not rely on simultaneous access for educational outcomes (Johnson, 2006; Oztok et al., 2013). Despite such modalities being developed in the past to enrich educational offers mainly in high schools and colleges, these were adopted on large scale only when the pandemic occurred to sustain students learning outcomes during the exceptional school closures (Naidu, 2020).

According to UNESCO (2020a), during the school closures in spring 2020, different countries carried out emergency educational programs through online platforms, television, radio, and take-home packages. In this attempt to provide an alternative learning environment, it is crucial to underline distance learning (1) is strongly based on technology and (2) seems to be more effective if the teacher is prepared to use this methodology (Adov & Mäeots, 2021).

The unexpected change in the teaching modality and learning environment had a strong impact both on learning and teaching. With respect to learning, the past 2 years witnessed an increase in the number of scientific works dedicated to exploring the effects of distance learning on students from more disadvantaged backgrounds. Overall, the already-existing inequalities in educational opportunities further increased because of the lack of internet connectivity or access to digital devices necessary to engage in online lessons (Mac Domhnaill et al., 2021), with indirect detrimental consequences on academic achievement (Conto et al., 2021; Donnelly & Patrinos, 2022; Zierer, 2021) and students' mental health (Caputi et al., 2021; Di Malta et al., 2022; Qin et al., 2021; Scarpellini et al., 2021).

Less attention has been placed on the effects on teachers of the sudden shift from traditional to distance learning, and little is known about how they managed to cope with the novel situation (Lukas & Yunus, 2021). Indeed, studies of distance learning conducted before the COVID-19 shutdown underlined that the skills and the knowledge required to teach in a traditional classroom learning environment differ greatly from those necessary in a distance learning setting (Pulham & Graham, 2018). Most teachers at the time of the COVID-19 outbreak were not appropriately trained on the application of distance learning programs (Ewing & Cooper, 2021), although effective distance learning had already

been implemented before the pandemic (König et al., 2020; Tejedor et al., 2021). Thus, the rapid transition to distance learning elicited many challenges for teachers at various levels of education (Lukas & Yunus, 2021). Through a survey, Alea et al. (2020) investigated the main difficulties faced by teachers in the Philippines during the first wave of the COVID-19 pandemic and found that basic education teachers were less ready to offer distance education services compared to college teachers, because of the less-advanced facilities, equipment and technological training provided by schools. As argued by Garzon Artacho et al. (2020), the development of digital teaching competence is still a challenge for the education system and must be a key issue in the training of current teachers. Moreover, the existing literature highlighted that a major challenge faced by teachers during the emergency was the organization of the distance learning didactic. Van der Spoel et al. (2020) found that teachers struggled to adapt their face-to-face lessons to a technological mediated setting, and they were not always satisfied with the result. Teachers' gender and personal characteristics (such as traits and prior digital competencies) have also been found to play a role in their overall experience of distance learning. The large disparities found among teachers' readiness to distance learning partly explain differences in their self-efficacy and their positive experience of remote teaching (van der Spoel et al., 2020). These factors, in turn, could have an impact on the delivery of quality teaching.

Within the Italian context, however, teachers' opinions in the immediate aftermath of lockdown were collected only in a few studies. For instance, Berti et al. (2021) asked teachers about the impact of the pandemic on themselves and on children, including children's vulnerabilities and resources and the coping strategies that teachers implemented in this period. Nonetheless, this research was conducted only among teachers working in Early Childhood Education and Care centers, thereby excluding school dynamics experienced by teachers working at other school levels. Giovannella et al. (2020) were the first to capture Italian teachers' perspective on teaching strategies adopted during lockdown, recruiting primary and secondary school teachers. However, their study addressed neither teachers' perceptions concerning distance teaching and learning nor their feelings. Despite these efforts, to date, there is a lack of studies of the actual challenges, experiences, and emotional responses that Italian teachers working at different educational levels faced during distance education. Examining how teachers implemented distance learning, identifying the main difficulties that they faced and how they felt in performing a novel teaching modality are fundamental for gaining insight into the role that distance learning environment plays in teaching and learning outcomes as well as in overall well-being. Moreover, investigating teachers' experiences is crucial for understanding how information and communications technology could improve future distance education practices to provide a better learning environment.

The present study

Considering the unprecedented situation of the COVID-19 lockdown and the scarce literature on the topic, the main aim of the current study was to investigate the impact of the adoption of distance learning during the first wave of the COVID-19 outbreak on primary and secondary school teachers in Italy. We consider this investigation fundamental, because it was the first time in history that learning activities were carried out exclusively through the implementation of distance learning modalities by all levels of education, including primary and secondary schools. Specifically, through a semi-structured questionnaire, we

aimed to provide understanding of teachers' opinions regarding various aspects connected with the rapid shift from traditional to distance learning setting. To pursue this goal, we examined (1) didactic modalities implemented by teachers, (2) teachers' opinions on students' difficulties with distance learning, (3) teachers' opinions on their own difficulties dealing with distance learning and (4) teachers' feelings during distance learning, taking into account differences in teaching stages (primary and secondary school) and teachers' ages.

Overall, this study adds to the existing literature in various ways. First, we provided a more-global and detailed picture of the unprecedented context of the forced distance learning environment during the COVID-19 pandemic in Italy, exploring the didactic modalities adopted by teachers, the major challenges associated with distance learning and teachers' feelings during the implementation of this novel teaching practice. Second, expanding upon previous works, we also evaluated the role of teaching stages and teachers' age, in order to see whether those sociodemographic variables could be linked to the challenges experienced within the distance learning setting. Third, the findings of this study could provide some meaningful suggestions for effective distance learning environments in primary and secondary education.

Method

Research design

To gather data on teachers' opinions, a descriptive qualitative study was performed. This approach was chosen because qualitative methods are well suited to studying individuals' perceptions of a phenomenon that is still not well explored in literature (Elliott & Timulak, 2005). Because we were interested also in comparing the answers for various teachers' subgroups (i.e., school level and age), we subsequently processed the collected qualitative data using a quantitative method, therefore applying a qualitative-quantitative research design (Green, 2001; Srnka & Koeszegi, 2007).

Procedure

The study was carried out between April and May 2020 (during school closure because of the total Italian lockdown). The data were collected through an online semi-structured questionnaire with open-ended questions administrated to teachers. The target population was constituted by teachers working in public primary and secondary schools[1] in the northern regions of Italy. In particular, for the sampling procedure, we employed a randomized recruitment of primary and secondary schools from a database of public schools in northern Italy. An invitation letter to participate in the research was sent by email to the randomly-selected schools to provide information about the study, its goals, and the link to the questionnaire. The schools which agreed to participate to the study subsequently were sent the invitation letter to the teachers. The questionnaire was anonymous and completed upon

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[1] According to the Italian school system, primary education is delivered to children aged 6–10 years, while secondary education concerns middle- and high-school students (i.e., preadolescents and adolescents from 11 to 19 years of age).

agreement of informed consent. The study was performed following the ethical standards of the 1964 Declaration of Helsinki (L. 18.02.1989, n. 56), Italian law for data privacy (DLGS 196/2003), and European data-protection law (European General Data Protection Regulation—GDPR UE 2016/67).

Participants

In total, 290 teachers completed the questionnaire. Nonetheless, 20 were excluded from the analyses because of incomplete answers. Therefore, the final sample included 270 teachers (239 females, corresponding to 88.5% of the sample) with a mean age of 49.5 years ($SD = 9.74$). All teachers were working in Italian primary ($n = 135$) and secondary schools ($n = 135$). Subjects taught by participants were humanities (59%), STEM (28%), and both humanities and STEM (13%). The sample size was determined using the principle of saturation, which refers to ceasing data sampling when no new themes emerge from the data (Glaser & Strauss, 1967; for a review, see Saunders et al., 2018), and turned out to be adequate for the study aims. Moreover, the sample appeared to be representative of the population's mean age (49.5 years in our sample, compared with 48.6 in the target population; OCSE 2019) and gender (88.5% females in our sample, compared with 80% in the target population; OCSE 2019).

Measures

The questionnaire was developed according to the study aims and included eight questions divided into two sections. The first section consisted of four items assessing age, gender, teaching stage (primary or secondary school) and subjects taught by teachers. In the second section, we asked four open-ended questions exploring didactic and psychological aspects associated with distance learning implementation. A qualitative option was chosen to allow teachers to better explain their teaching experiences. In particular, the first question assessed the didactic modalities employed ("What are the main didactic modalities that you have used during the distance learning period?"), the second question focused on students' main difficulties associated with distance learning ("What are the main difficulties of students during the distance learning period?"), the third one focused on teachers' difficulties during distance education ("What are the main difficulties you have encountered during the distance learning period?") and the fourth one involved teachers' emotions ("What feelings have you experienced during the distance learning period?").

Analytic strategy

Responses to open-ended questions were content analyzed employing an inductive approach. The aim of this procedure was to develop a coding system and identify representative thematic categories for each open-ended question. Answers were analyzed choosing 'thought units' as units of analysis (Srnka & Koeszegi, 2007). Furthermore, we decided to assign multiple codes to each response to prevent information loss. The inductive content analysis consisted of various steps. Firstly, two researchers with high expertise in educational psychology familiarized themselves with the material by reading all the answers. Secondly, to define coding rules and categories, we selected a random subsample of responses that reflected the sample's characteristics such as age, educational level

and school subject (Srnka & Koeszegi, 2007). The two researchers individually created the initial coding rules and categories derived from the subsample, and then verified the initial coding rules by classifying all teachers' answers. In order to confirm the accuracy of the coding system and guarantee the consistency of the coding rules across coders, the discrepancies that emerged were discussed through research meetings. Finally, two raters—blind to the aims of the study—were enrolled to independently categorize teachers' answers using the coding system developed by the two researchers. The final coding system was used to describe and categorize teachers' didactic modalities and their opinions about students' difficulties, teachers' difficulties, and teachers' feelings associated with distance learning (see Table 1). The two raters' inter-coder reliability was established using Cohen's Kappa (Sim & Wright, 2005; see Table 1) and discrepancies were resolved through research group meetings.

Results

Using R software, we employed frequency distributions to describe the categories' frequency and chi-square tests (significance $p < .05$) to examine differences between educational stages and teachers' age. Specifically, we subdivided the sample in three tertiles based on age, thereby selecting two subsamples: one of younger ($n = 90$, $M = 38.1$ years, $SD = 6.25$) and one of older teachers ($n = 90$, $M = 59.3$ years, $SD = 2.72$) (Table 2).

Didactic modalities

Considering the question on the didactic modalities, the content analysis classified the answers into four categories. Most teachers mainly employed both synchronous and asynchronous didactic modalities (78.5%). Some teachers reported that they used only synchronous (15.9%) or asynchronous (16.2%) modalities. Few teachers also reported sending homework to students (5.5%). Comparing the differences between primary and secondary school teaching modalities, we found that secondary school teachers reported more usage of synchronous modalities compared with primary school teachers, but this difference did not reach statistical significance (37% vs. 63%; χ^2 (1) = 3.35, $p = .067$). We did not find any other difference between primary and secondary school teachers based on the other categories associated with this question.

Students' difficulties

Upon content analyzing the answers to the second open-ended question, we obtained seven categories describing students' difficulties according to the teachers. The reported difficulties concerned: problems in using technologies (53.7%), impoverishment of social relationships with teachers and peers (33.3%), difficulties regarding independence (17.4%), motivation (14.4%) and attention (11.8%), lack of support from family members (7%), and problems with routines adherence (7%). Comparing primary school to secondary school teachers revealed significantly more students' relational difficulties (66% vs. 34%; χ^2 (1) = 13.07, $p < .001$) and lack of assistance by parents (84% vs. 16%; χ^2 (1) = 9.57, $p = .002$). There were no significant differences between primary and secondary school teachers on the other reported difficulties.

Table 1 Open-ended questions, coding categories and inter-coder reliabilities (κ)

Open-ended questions	Categories	κ
1. What are the main didactic modalities that you have used during the distance learning period?	Synchronous and asynchronous modalities	0.78
	Asynchronous modality	0.41
	Synchronous modality	0.74
	Sending homework to students	0.47
2. What are the main difficulties of students during the distance learning period?	Problems in using technologies	0.96
	Impoverishment of social relations with teachers and peers	0.92
	Lack of independence	0.77
	Lack of motivation	0.84
	Lack of attention	0.95
	Lack of support from family members	0.64
	Problems with routine adherence	0.72
3. What are the main difficulties you have encountered during the distance learning period?	Problems in organizing distance learning	0.48
	Problems in managing technical issues	0.60
	Relational difficulties	0.58
	Poor digital skills	0.72
	Problems in maintaining well-being	0.61
	Lack of guidelines for distance learning	0.82
4. What feelings have you experienced during the distance learning period?	Anxiety	0.90
	Stress	0.83
	Helplessness	0.74
	Confusion	0.82
	Resilience	0.73
	Inadequacy	0.54
	Nostalgia	0.55

Table 2 Coding categories, code occurrence (n), code frequency (%), chi-square (χ^2) and statistical significance

Categories	n	%	School stages	Age
Synchronous and asynchronous modalities	212	78.5	1.40	–
Asynchronous modality	44	16.2	0.10	–
Synchronous modality	43	15.9	3.35	–
Sending homework to students	15	5.5	0.63	–
Problems in using technologies	145	53.7	2.52	–
Impoverishment of social relations with teachers and peers	90	33.3	13.07***	–
Lack of independence	47	17.4	3.12	–
Lack of motivation	39	14.4	0.26	–
Lack of attention	32	11.8	0.25	–
Lack of support from family members	19	7	9.57**	–
Problems with routine adherence	19	7	0.51	–
Problems in organizing distance learning	136	50.4	0.06	0.08
Problems in managing technical issues	97	35.9	1.94	4.12*
Relational difficulties	83	30.7	3.91*	3.16
Poor digital skills	38	14	3.06	4.49*
Problems in maintaining well-being	23	8.5	1.18	0.31
Lack of guidelines for distance learning	15	5.5	0.07	0.10
Anxiety	99	36.6	0.78	1.16
Stress	79	29.2	1.45	0
Helplessness	52	19.2	3.43	3.62
Confusion	51	18.8	0.22	0.03
Resilience	34	12.6	4.84*	6.03*
Inadequacy	27	10	0.04	0.52
Nostalgia	18	6.7	0.00	0.07

*$p < .05$, **$p < .01$, ***$p < .001$

Teachers' difficulties

Concerning the question regarding teachers' difficulties, six categories were obtained. Teachers reported difficulties in organizing distance learning (50.4%), managing technical issues (35.9%), maintaining relations with students, parents and colleagues (30.7%), poor digital skills (14%), difficulties in maintaining well-being (8.5%) and a lack of guidelines on distance learning (5.5%). Problems in maintaining relations were reported significantly more by primary school compared with secondary school teachers (59% vs. 41%; χ^2 (1) = 3.91, $p = .048$). Poor digital skills were reported more frequently by primary school compared with secondary school teachers, but this difference did not reach significance (63.2% vs. 37%; χ^2 (1) = 3.06, $p = .080$). Furthermore, we found that older teachers compared with younger reported significantly more difficulties associated to the management of technical issues (38% vs. 25%; χ^2 (1) = 4.12, $p = .042$) and poorer digital skills (18% vs. 8%; χ^2 (1) = 4.49, $p = .033$).

Teachers' feelings

Content analyzing teachers' answers concerning their feelings during the distance learning period led to seven categories. Most of the sample reported negative feelings: anxiety (36.6%), stress (29.2%), helplessness (19.2%), confusion (18.8%), inadequacy (10%) and nostalgia (6.7%). However, some teachers reported a sense of resilience and opportunity associated with distance learning (12.6%). Despite not having reached the significance threshold, primary school teachers reported more helplessness compared with secondary school teachers (61% vs. 38%; χ^2 (1) = 3.43, p = .06). Furthermore, secondary school teachers expressed significantly more resilience and opportunity feelings compared with primary school teachers (68% vs. 32%; χ^2 (1) = 4.84, p = .028). There were no other statistically significant differences between primary and secondary school teachers in self-reported feelings.

Interestingly, regarding the relationship between teachers' age and feelings, older teachers reported significantly more resilience and opportunity feelings associated with distance learning compared with younger teachers (74% vs. 26%; χ^2 (1) = 6.03, p = .014). Younger teachers reported more helplessness compared with older teachers, but this difference did not reach the conventional level of statistical significance (65% vs. 35%; χ^2 (1) = 3.43, p = .056). There were no other statistically-significant differences among younger and older teachers in the other categories.

Discussion and implications for distance learning

The present study aimed to explore teachers' opinions about distance learning environment during the first wave of the COVID-19 pandemic in Italy. Specifically, we investigated the main didactic modalities implemented by teachers, teachers' opinions about students' difficulties with distance learning, teachers' opinions on their own difficulties associated with distance learning, and teachers' feelings experienced during that period. Unlike previous studies, we aimed to explore those areas of interest while comparing different educational levels and also taking into consideration teachers' age. This way, we sought to provide a more nuanced picture of the emergent learning environment created by information technology, identify the key issues associated with distance learning environment, and provide pragmatic indications about how to improve future distance educational practices.

Didactic modalities

The majority of teachers employed a hybrid format, presenting educational content both synchronously (e.g., live video-lectures) and asynchronously (e.g., exercises). The hybrid modality resembled the traditional classroom learning environment, consisting of interactive activities and live topic explanations on one hand, and individual or group homework activities on the other hand. In this case, teachers were trying to adapt to a new learning environment, attempting to reproduce typical classroom dynamics by carrying out different teaching modalities (Giovannella et al., 2020). Some teachers, however, used only synchronous or asynchronous learning. Furthermore, primary school teachers implemented less synchronous didactic modalities compared with secondary school teachers. This tendency

could be explained by the limited technological skills and attention resources observed in younger pupils (Klapproth et al., 2020), which could have influenced primary school teachers' decision to avoid synchronous modalities.

Students' difficulties

Teachers identified problems in using technologies (e.g., lack of digital devices and adequate technological equipment, low internet connectivity or limited internet access, insufficient students' technological skills) as the main student issue during distance learning. No difference in technological difficulties between school levels was found, suggesting that neither primary nor secondary school students were well equipped or prepared for distance learning during the COVID-19 pandemic. Our findings are in line with recent Italian (Giovannella et al., 2020) and international studies (Adnan & Anwar, 2020; Almanthari et al., 2020; Brom et al., 2020; Fauzi & Khusuma, 2020; Lassoued et al., 2020; MacDomhnaill et al., 2021; Verma & Priyamvada, 2020), which showed that technology issues and poor digital competences were among the students' greatest problems affecting distance learning, from primary school to university. It is noteworthy that a lack of technological devices and knowledge necessary for distance learning negatively impacts students' engagement into educational activities and hinders their learning process (Khlaif et al., 2021). Thus, to facilitate appropriate distance education on a large scale, the government should intervene by providing learners from more-disadvantaged backgrounds with digital devices and stable internet connections. Moreover, schools should invest more in computer science training to enable students' digital skills and to cater to the twenty-first century trend of technology utilization in education.

Furthermore, one-third of teachers pointed out that students faced an impoverishment of social interaction with peers and teachers, which is in line with a vast number of recent studies (Adnan & Anwar, 2020; Arora & Srinivasan, 2020; Bond, 2020; Cerniglia et al., 2020; Putri et al., 2020; Scarpellini et al., 2021). During distance learning, students could neither share their learning experiences nor spend time with their school friends or teachers like they could before the pandemic. Moreover, most face-to-face didactic interactions—such as eye contact, physical touch, sharing attention, providing praise—were not possible (Verma & Priyamvada, 2020). Most notably, we found that primary school pupils faced more relational difficulties than secondary school students, as observed by teachers. A possible explanation is that primary school teachers implemented less synchronous lessons, which decreased the amount of student–teacher and student–student contact. Furthermore, it could be argued that adolescents, during the first phases of the COVID-19 pandemic, were able to maintain a meaningful interaction with schoolmates and teachers through different social media applications, instant messages, and emails (Ferraro et al., 2020; Greenhow & Chapman, 2020), whereas primary school children were unable to do so because of their poor digital skills and reasonable lack of independence (Klapproth et al., 2020). The lack of social interactions in a learning context might have detrimental effects on students' learning outcomes, motivation, engagement, interest, and well-being (Sargeant et al., 2006; UNESCO, 2020b). Because social contact is essential for successful learning and because the present study revealed that a major challenge to be overcome in distance education is indeed a lack of interactions, future work should focus on investigating how to sustain effective relations during distance learning, especially for primary education. Novel user-friendly technologies, platforms, software, and teaching strategies which allow younger learners to interact with teachers and schoolmates during distance education should be

developed and tested. Literature on higher education suggests that increasing dialogue in distance learning settings is helpful for ensuring more-meaningful contact between teachers and students (Bouhnik & Marcus, 2006). Thus, cooperative and collaborative distance learning activities which involve active discussions and sharing ideas could be designed for primary school children.

Additionally, teachers reported students' problems with motivation, attention, independence in learning, support from family and adjustment to the new routine. Similar findings were observed also in previous literature on distance learning (Adnan & Anwar, 2020; Almazova et al., 2020; Lauret & Bayram-Jacobs, 2021; Muilenburg & Berge, 2005; Turner et al., 2020; Twenge & Campbell, 2018) that highlighted how all the above-mentioned factors are essential for supporting students' learning. Regarding motivation (and consequently also attention), some investigations suggest that it can be undermined by the adopted tools and online activities but also by students' inability to recognize the value and importance of the activity itself (e.g., Hartnett et al., 2011). Therefore, teachers need to be aware of the significant role that they play in influencing students' attitudes, motivation and attention when designing distance learning activities. Discussing and guiding students to comprehend how online activities could help in reaching the learning goals could be helpful. Notably, younger children experienced more difficulties with poor parents' support, which could be explained by younger children's higher need for assistance, which could not always be warranted by parents working from home (Anderson & Hira, 2020; Flack et al., 2020). Taken together, these findings suggest that students faced several challenges in managing distance learning and some of those difficulties (i.e., relational difficulties, lack of support by family) mainly concerned primary school children.

Teachers' difficulties

The main difficulty faced by teachers during the implementation of distance learning concerned the organizational aspect (e.g., issues in planning and implementing distance learning, lack of adequate teaching material, problems in assessing students' knowledge). This result is in line with the findings by Fauzi and Khusuma (2020), who demonstrated that more than 40% of primary school teachers had difficulties in planning and executing lessons for distance learning. It is crucial to educate teachers through specific training on how to effectively implement distance learning; teachers should know how to plan and deliver different educational content using synchronous and asynchronous modalities, evaluate the success of a distance learning activity, boost students' motivation, maintain high attention in a virtual classroom, and assess students' knowledge (Alea et al., 2020).

In addition, 36% of our sample experienced technical difficulties (e.g., lack of digital devices, lack of proper equipment, absence of internet connectivity) and 14% of teachers reported that their poor digital skills were an obstacle for implementing successful distance education. This result aligns well with previous findings (Alea et al., 2020; Fauzi & Khusuma, 2020; Giovannella et al., 2020). Not surprisingly, older teachers reported significantly more technical difficulties and poorer digital skills than younger teachers. Indeed, younger teachers typically have higher technical literacy than older teachers with more familiarity with the technology. Our findings are in line with those from Almazova et al. (2020), who found that university teachers older than 55 years highlighted the need for more support and instruction from IT teams. However, in contrast with previous literature (e.g., Eickelmann & Drossel, 2020), we did not find any significant difference between primary and secondary school teachers in terms of digital literacy, suggesting that, in the

Italian context, teachers working at different school levels felt equally (un)prepared for distance learning.

Moreover, one-third of teachers reported having struggled with establishing communication with students and keeping positive relationships with them, as well as with colleagues or pupils' parents. These results are consistent with several studies which highlighted the teachers' challenge with conducting a learning experience without physical contact, face-to-face interaction, and feedback from students (Alea et al., 2020; Giovannella et al., 2020; Lauret & Bayram-Jacobs, 2021). Indeed, relationships with pupils have an essential role in teaching, as well as in determining job satisfaction and providing meaning to the profession (Spilt et al., 2011; Veldman et al., 2013). Furthermore, relationships with colleagues and pupils' parents are also important elements of teaching experience and teacher identity (Hargreaves, 2001; Hughes & Kwok, 2007; Kim & Asbury, 2020). Thus, a lack of interaction can negatively impact teachers' professional satisfaction. Schools could consider implementing online social programs for teachers outside the formal teaching timetable to enable moments of connection and support to occur. It is important to notice that, similarly to students, primary school teachers had greater problems in online communication and interaction compared to secondary school teachers. This finding indicates again that the implementation of distance learning in primary schools is more challenging than in higher education.

Teachers' feelings

Lastly, our study investigated teachers' emotions during the distance learning period. Exploring teachers' feelings is fundamental because their well-being also affects teaching quality and students' well-being (Arens & Morin, 2016; Harding et al., 2019; McInerney et al., 2018). That is, when teachers feel good, they engage more with students who, in turn, are more motivated in the learning process (Moè et al., 2010). The vast majority of the sample reported experiencing negative feelings, such as anxiety, stress and helplessness, which is in line with several studies emphasizing that distance learning during the COVID-19 pandemic was perceived as stressful by teachers (Alea et al., 2020; Besser et al., 2020; Eickelmann & Drossel, 2020; Kim & Absury, 2020; Klapproth et al., 2020; Ozamiz-Etxebarria et al., 2021; Verma & Priyamvada, 2020). Teachers' negative feelings during school closure are assumed to be linked to the abruptness of distance learning measures, a lack of familiarity with those modalities, and uncertainty about the duration of the situation (UNESCO, 2020b).

In accordance with stress and coping theories (Lazarus & Folkman, 1984; Parker & Endler, 1996), which recognize that individuals can interpret the same stressors in different ways, we found that 13% of the sample reported a sense of resilience and opportunity associated with distance learning. Some teachers found this situation to be an experience of growth because new digital skills and teaching modalities could be tried out and acquired. In particular, older teachers reported more resilience compared with younger teachers, whereas younger teachers felt more helpless compared with older ones. These results were unexpected: older teachers in our sample reported more difficulties in managing technological issues and poorer digital skills, and previous studies revealed that, whenever teachers do not feel competent enough using technology, they experience higher levels of stress and negative emotions (Al-Fudail & Mellar, 2008; Peterson et al., 2020). However, our results could be explained by taking into consideration teachers' self-efficacy beliefs about their own ability to succeed in specific situations (Bandura, 1977). Novice and younger

teachers generally hold lower self-efficacy beliefs than older teachers because of their fewer mastery experiences (Tschannen-Moran & Hoy, 2007). One's sense of self-efficacy influences the effort invested in teaching, the goals that teachers set, their coping strategies adopted, and their resilience when facing several challenges (Tschannen-Moran et al., 1998; Tschannen-Moran & Hoy, 2001). Therefore, lower self-efficacy among younger teachers could have negatively influenced their adaptation to online teaching, which consequently increased their feelings of helplessness. On the other hand, older teachers, who have generally stronger self-efficacy beliefs (Tschannen-Moran & Hoy, 2007), might have adapted better to online teaching, which promoted positive feelings. Thus, belonging to a generation of 'digital natives' (Prensky & Berry, 2001) and having more-developed digital skills might not guarantee a successful adaptation to distance learning and feelings of well-being. Affective-motivational factors, such as teachers' self-efficacy, should be considered when studying well-being during distance learning. More research on the role of affective-motivational factors and computer literacy in successful distance learning is needed too.

Limitations of the study

The findings of this study should be read in the light of some limitations. First, we gathered data only on teachers' experiences. Future research might compare teachers' responses with those of the students and their parents. Second, our sample was not representative of the general population of Italian teachers, because participants were primary and secondary school teachers from northern Italy only. Third, the analytical strategies employed were mainly qualitative. Finally, we used a cross-sectional design, which prevented assessing longitudinal links between the impact of the COVID-19 pandemic and the learning process or teachers' well-being.

Conclusion

The current study aimed to unveil primary and secondary school teachers' perspective on distance learning during the early COVID-19 pandemic period. Giving voice to teachers' beliefs allowed us to advance understanding of distance learning environment and provide novel insight into improvements needed for future distance educational practices. In summary, the present findings disclosed a picture of the Italian context in which technological weaknesses and lack of interactions were the main threats to distance learning quality throughout K–12 education. While technological gaps could be resolved through effective training and equipment, future studies should deal with how information and communications technology could sustain a meaningful interaction between students and teachers, especially for primary education. Indeed, our findings suggest that, in this novel educational environment, teachers' roles have changed significantly, placing strong emphasis on the ability to encourage communication, discussion, and motivation among students. In conclusion, the present study underlines that social interactions are a very important part of the educational experience and must be prioritized also—and especially—in the distance learning setting.

Declarations

References

Adnan, M., & Anwar, K. (2020). Online learning amid the COVID-19 pandemic: Students' perspectives. *Journal of Pedagogical Sociology and Psychology*, *2*(1), 45–51.

Adov, L., & Mäeots, M. (2021). What can we learn about science teachers' technology use during the COVID-19 pandemic? *Education Sciences*, *11*(6), 255.

Al-Fudail, M., & Mellar, H. (2008). Investigating teacher stress when using technology. *Computers & Education*, *51*(3), 1103–1110.

Alea, L. A., Fabrea, M. F., Roldan, R. D. A., & Farooqi, A. Z. (2020). Teachers' Covid-19 awareness, distance learning education experiences and perceptions towards institutional readiness and challenges. *International Journal of Learning Teaching and Educational Research*, *19*(6), 127–144.

Almanthari, A., Maulina, S., & Bruce, S. (2020). Secondary school mathematics teachers' views on E-learning implementation barriers during the COVID-19 pandemic: The case of Indonesia. *Eurasia Journal of Mathematics Science and Technology Education, 16*(7), em1860.

Almazova, N., Krylova, E., Rubtsova, A., & Odinokaya, M. (2020). Challenges and opportunities for russian higher education amid COVID-19: Teachers' perspective. *Education Sciences*, *10*(12), 368.

Anderson, E., & Hira, A. (2020). Loss of brick-and-mortar schooling: How elementary educators respond. *Information and Learning Sciences*, *121*(5/6), 411–418.

Arens, A. K., & Morin, A. J. (2016). Relations between teachers' emotional exhaustion and students' educational outcomes. *Journal of Educational Psychology*, *108*(6), 800–813.

Arora, A. K., & Srinivasan, R. (2020). Impact of pandemic COVID-19 on the teaching–learning process: A study of higher education teachers. *Prabandhan: Indian Journal of Management*, *13*(4), 43–56.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215.

Berti, S., Cigala, A., & Severgnini, L. (2021). Effects of the COVID-19 pandemic in ECEC centers: Social and psychological impact on children and teachers. *Psychology Hub*, *38*(3), 47–60.

Besser, A., Flett, G. L., Nepon, T., & Zeigler-Hill, V. (2020). Personality, cognition, and adaptability to the Covid-19 pandemic: Associations with loneliness, distress, and positive and negative mood states. *International Journal of Mental Health and Addiction*, 1–25.

Bond, M. (2020). Schools and emergency remote education during the COVID-19 pandemic: A living rapid systematic review. *Asian Journal of Distance Education*, *15*(2), 191–247.

Brom, C., Lukavský, J., Greger, D., Hannemann, T., Straková, J., Švaříček, R., & July (2020). Mandatory home education during the COVID-19 lockdown in the Czech Republic: A rapid survey of 1st-9th graders' parents. *Frontiers in Education*, *5*, 103.

Caputi, M., Forresi, B., Giani, L., Michelini, G., & Scaini, S. (2021). Italian children's well-being after lockdown: Predictors of psychopathological symptoms in times of COVID-19. *International Journal of Environmental Research and Public Health*, *18*(21), 11429.

Cerniglia, L., Cimino, S., & Ammaniti, M. (2020). L'impatto del periodo di isolamento legato al Covid-19 nello sviluppo psicologico infantile. *Psicologia Clinica dello Sviluppo*, *24*(2), 187–190.

Contini, D., Di Tommaso, M. L., Muratori, C., Piazzalunga, D., & Schiavon, L. (2021). *The Covid-19 pandemic and school closure: Learning loss in mathematics in primary education* (Carlo Alberto Notebooks N. 664). Collegio Carlo Alberto.

Conto, C. A., Akseer, S., Dreesen, T., Kamei, A., Mizunoya, S., & Rigole, A. (2021). Potential effects of COVID-19 school closures on foundational skills and country responses for mitigating learning loss. *International Journal of Educational Development*, *87*, 102434.

Di Malta, G., Bond, J., Conroy, D., Smith, K., & Moller, N. (2022). Distance education students' mental health, connectedness and academic performance during COVID-19: A mixed-methods study. Distance Education, *43*(1): 97-118.

Donnelly, R., & Patrinos, H. A. (2022). Learning loss during COVID-19: An early systematic review. *Prospects*, *51*, 601–609.

Eickelmann, B., & Drossel, K. (2020). *Schule auf distanz. Perspektiven und empfehlungen für den neuen schulalltag: eine repräsentative befragung von lehrkräften in Deutschland*. Vodafone Stiftung Deutschland.

Elliott, R., & Timulak, L. (2005). Descriptive and interpretive approaches to qualitative research. In J. Miles (Ed.), *A handbook of research methods for clinical and health psychology* (Vol. 1, pp. 147–159). Oxford University Press.

Ewing, L. A., & Cooper, H. B. (2021). Technology-enabled remote learning during Covid-19: Perspectives of Australian teachers students and parents. *Technology Pedagogy and Education, 30*(1), 41–57.

Fauzi, I., & Khusuma, I. H. S. (2020). Teachers' elementary school in online learning of COVID-19 pandemic conditions. *Jurnal Iqra': Kajian Ilmu Pendidikan*, *5*(1), 58–70.

Ferraro, F. V., Ambra, F. I., Aruta, L., & Iavarone, M. L. (2020). Distance learning in the Covid-19 era: Perceptions in Southern Italy. *Education Sciences*, *10*(12), 355.

Flack, C. B., Walker, L., Bickerstaff, A., & Margetts, C. (2020). *Socioeconomic disparities in Australian schooling during the COVID-19 pandemic*. Pivot Professional Learning.

Garzon Artacho, E., Martínez, T. S., Ortega Martin, J. L., Marin Marin, J. A., & Gomez Garcia, G. (2020). Teacher training in lifelong learning—The importance of digital competence in the encouragement of teaching innovation. *Sustainability*, *12*(7), 2852.

Giovannella, C., Passarelli, M., & Persico, D. (2020). Measuring the effect of the Covid-19 pandemic on the Italian learning ecosystems at the steady state: A school teachers' perspective. *Interaction Design and Architecture Journal*, *45*, 1–9.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Aldine.

Green, E. C. (2001). Can qualitative research produce reliable quantitative findings? *Field Methods*, *13*(1), 3–19.

Greenhow, C., & Chapman, A. (2020). Social distancing meet social media: Digital tools for connecting students, teachers, and citizens in an emergency. *Information and Learning Sciences*, *121*(5/6), 341–352.

Gurcan, F., & Cagiltay, N. E. (2020). Research trends on distance learning: A text mining-based literature review from 2008 to 2018. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2020.1815795.

Harding, S., Morris, R., Gunnell, D., Ford, T., Hollingworth, W., Tilling, K., & Kidger, J. (2019). Is teachers' mental health and wellbeing associated with students' mental health and wellbeing? *Journal of Affective Disorders*, *242*, 180–187.

Hargreaves, A. (2001). The emotional geographies of teachers' relations with colleagues. *International Journal of Educational Research*, *35*(5), 503–527.

Hartnett, M., St George, A.., & Dron, J. (2011). Examining motivation in online distance learning environments: Complex, multifaceted, and situation-dependent. *International Review of Research in Open and Distributed Learning*, *12*(6), 20–38.

Hall, T., Connolly, C., Grádaigh, S., Burden, K., Kearney, M., Schuck, S., & Kosmas, P. (2020). Education in precarious times: A comparative study across six countries to identify design priorities for mobile learning in a pandemic. *Information and Learning Sciences*, *121*(5/6).

Hughes, J., & Kwok, O. M. (2007). Influence of student–teacher and parent–teacher relationships on lower achieving readers' engagement and achievement in the primary grades. *Journal of Educational Psychology*, *99*(1), 39–51.

Johnson, G. M. (2006). Synchronous and asynchronous text-based CMC in educational contexts: A review of recent research. *TechTrends*, *50*(4), 46–53.

Karanezi, X. (2014). Primary and lower secondary school teachers: Teachers' attitudes and perceptions about traditional teaching methodologies and modern teaching methodologies according to RWCT. *Creative Education*, *5*(16), 1567.

Khlaif, Z. N., Salha, S., & Kouraichi, B. (2021). Emergency remote learning during COVID-19 crisis: Students' engagement. *Education and Information Technologies*, *26*(6), 7033–7055.

Kim, L. E., & Asbury, K. (2020). 'Like a rug had been pulled from under you': The impact of COVID-19 on teachers in England during the first six weeks of the UK lockdown. *British Journal of Educational Psychology*, *90*(4), 1062–1083.

Klapproth, F., Federkeil, L., Heinschke, F., & Jungmann, T. (2020). Teachers' experiences of stress and their coping strategies during COVID-19 induced distance teaching. *Journal of Pedagogical Research*, *4*(4), 444–452.

König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: Teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education*, *43*(4), 608–622.

Lassoued, Z., Alhendawi, M., & Bashitialshaaer, R. (2020). An exploratory study of the obstacles for achieving quality in distance learning during the COVID-19 pandemic. *Education Sciences*, *10*(9), 232.

Lauret, D., & Bayram-Jacobs, D. (2021). COVID-19 lockdown education: The importance of structure in a suddenly changed learning environment. *Education Sciences*, *11*(5), 221.

Lavy, S., & Naama-Ghanayim, E. (2020). Why care about caring? Linking teachers' caring and sense of meaning at work with students' self-esteem, well-being, and school engagement. *Teaching and Teacher Education*, *91*, 103046.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.

Lukas, B. A., & Yunus, M. M. (2021). ESL teachers' challenges in implementing E-learning during COVID-19. *International Journal of Learning Teaching and Educational Research*, *20*(2), 330–348.

MacDomhnaill, C., Mohan, G., & McCoy, S. (2021). Home broadband and student engagement during COVID-19 emergency remote teaching. *Distance Education*, *42*(4), 465–493.

McInerney, D. M., Korpershoek, H., Wang, H., & Morin, A. J. (2018). Teachers' occupational attributes and their psychological wellbeing, job satisfaction, occupational self-concept and quitting intentions. *Teaching and Teacher Education*, *71*, 145–158.

Moè, A., Pazzaglia, F., & Ronconi, L. (2010). When being able is not enough. The combined value of positive affect and self-efficacy for job satisfaction in teaching. *Teaching and Teacher Education*, *26*(5), 1145–1153.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, *14*(2), 129–135.

Muilenburg, L. Y., & Berge, Z. L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education*, *26*(1), 29–48.

Naidu, S. (2020). It is the worst—And the best—Of times!. *Distance Education*, *41*(4), 425–428.

OCSE. (2019). *TALIS 2018 results (Vol. 1): Teachers and school leaders as lifelong learners*. OECD Publishing.

Ozamiz-Etxebarria, N., Berasategi Santxo, N., Idoiaga Mondragon, N., & Dosil Santamaría, M. (2021). The psychological state of teachers during the COVID-19 crisis: The challenge of returning to face-to-face teaching. *Frontiers in Psychology*, *11*, 3861.

Oztok, M., Zingaro, D., Brett, C., & Hewitt, J. (2013). Exploring asynchronous and synchronous tool use in online courses. *Computers & Education*, *60*(1), 87–94.

Parker, J. D., & Endler, N. S. (1996). Coping and defence: A historical overview. In M. Zeidner, & N. S. Endler (Eds.), *Handbook of coping: Theory, research and applications* (pp. 3–23). Wiley.

Peterson, L., Scharber, C., Thuesen, A., & Baskin, K. (2020). A rapid response to COVID-19: One district's pivot from technology integration to distance learning. *Information and Learning Sciences*, *121*(5/6), 461–469.

Prensky, M., & Berry, B. D. (2001). Do they really think differently. *On the Horizon*, *9*(6), 1–9.

Pulham, E., & Graham, C. R. (2018). Comparing K-12 online and blended teaching competencies: A literature review. *Distance Education*, *39*(3), 411–432.

Putri, R. S., Purwanto, A., Pramono, R., Asbari, M., Wijayanti, L. M., & Hyun, C. C. (2020). Impact of the COVID-19 pandemic on online home learning: An explorative study of primary schools in Indonesia. *International Journal of Advanced Science and Technology*, *29*(5), 4809–4818.

Qin, Z., Shi, L., Xue, Y., Lin, H., Zhang, J., Liang, P., & Zhang, C. (2021). Prevalence and risk factors associated with self-reported psychological distress among children and adolescents during the COVID-19 pandemic in China. *JAMA network open*, *4*(1), e2035487–e2035487.

Sargeant, J., Curran, V., Allen, M., Jarvis-Selinger, S., & Ho, K. (2006). Facilitating interpersonal interaction and learning online: Linking theory and practice. *Journal of Continuing Education in the Health Professions*, *26*(2), 128–136.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity*, *52*(4), 1893–1907.

Scarpellini, F., Segre, G., Cartabia, M., Zanetti, M., Campi, R., Clavenna, A., & Bonati, M. (2021). Distance learning in Italian primary and middle school children during the COVID-19 pandemic: A national survey. *Bmc Public Health*, *21*(1), 1–13.

Sim, J., & Wright, C. C. (2005). The kappa statistic in reliability studies: Use, interpretation, and sample size requirements. *Physical Therapy*, *85*(3), 257–268.

Simpson, R. J., & Galbo, J. J. (1986). Interaction and learning: Theorizing on the art of teaching. *Interchange*, *17*(4), 37–51.

Sisask, M., Värnik, P., Värnik, A., Apter, A., Balazs, J., Balint, M., & Wasserman, D. (2014). Teacher satisfaction with school and psychological well-being affects their readiness to help children with mental health problems. *Health Education Journal*, *73*(4), 382–393.

Srnka, K. J., & Koeszegi, S. T. (2007). From words to numbers: How to transform qualitative data into meaningful quantitative results. *Schmalenbach Business Review*, *59*(1), 29–57.

Spilt, J. L., Koomen, H. M., & Thijs, J. T. (2011). Teacher wellbeing: The importance of teacher–student relationships. *Educational Psychology Review*, *23*(4), 457–477.

Steele, J. P., Robertson, S. N., & Mandernach, B. J. (2018). Beyond content: The value of instructor-student connections in the online classroom. *Journal of the Scholarship of Teaching and Learning*, *18*(4), 130–150.

Tejedor, S., Cervi, L., Pérez-Escoda, A., Tusa, F., & Parola, A. (2021). Higher education response in the time of coronavirus: Perceptions of teachers and students, and open innovation. *Journal of Open Innovation: Technology Market and Complexity*, *7*(1), 43.

Tschannen-Moran, M., & Hoy, A. W. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education*, *23*(6), 944–956.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, *17*(7), 783–805.

Tschannen-Moran, M., Hoy, A. W., & Hoy, W. K. (1998). Teacher efficacy: Its meaning and measure. *Review of Educational Research*, *68*(2), 202–248.

Turner, K. L., Hughes, M., & Presland, K. (2020). Learning loss, a potential challenge for transition to undergraduate study following COVID19 school disruption. *Journal of Chemical Education*, *97*(9), 3346–3352.

Twenge, J. M., & Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports*, *12*, 271–283.

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2020a). *What have we learnt? Overview of findings from a survey of Ministries of Education on national responses to COVID-19*. UNESCO.

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2020b). Adverse consequences of school closures. https://en.unesco.org/covid19/educationresponse/consequences

Van der Spoel, I., Noroozi, O., Schuurink, E., & van Ginkel, S. (2020). Teachers' online teaching expectations and experiences during the Covid19-pandemic in the Netherlands. *European Journal of Teacher Education 43*(4), 623–638.

Veldman, I., Van Tartwijk, J., Brekelmans, M., & Wubbels, T. (2013). Job satisfaction and teacher–student relationships across the teaching career: Four case studies. *Teaching and Teacher Education*, *32*, 55–65.

Verma, M. G., & Priyamvada, M. (2020). COVID-19 and teaching: Perception of school teachers on usage of online teaching tools. *Mukt Shabd Journal*, *IX*, 2492–2503.

Zierer, K. (2021). Effects of pandemic-related school closures on pupils' performance and learning in selected countries: A rapid review. *Education Sciences*, *11*(6), 252.