«Emergency Remote Teaching» in Italy and Norway: Empirical Research Findings and Implications for Teacher Training

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ABSTRACT: *As schools closed due to the COVID-19 pandemic, online learning opportunities became crucial for the education of millions of students worldwide. In most countries, the transition from face-to-face teaching to distance learning took place in an emergency situation. This article aims to discuss the results of the empirical research produced in Italy and Norway on «emergency remote teaching» during the pandemic. Starting from the analysis and comparison of data gathered in and about the two countries, considerations will be drawn on the digital competence of teachers and on the areas that most need interventions at the level of teacher training and education policies.*

KEYWORDS: *COVID-19 pandemic, distance learning, «emergency remote teaching», teachers' digital competence, teacher training.*

Introduction

As schools closed due to the COVID-19 pandemic, online learning opportunities became crucial for the education of millions of students worldwide. In most countries, the transition from face-to-face teaching to distance learning took place in an emergency situation. Consequently, the sudden change was not preceded by organizational, technical, nor didactic reflections. Schools, teachers, pupils and their families found themselves facing an entirely new situation.

What has happened, and is still happening, in the face of the COVID-19 crisis has certainly led to inconveniences and criticalities in a sector as essential to society as that of school education. However, the experience, if analyzed with the lens of science and educational research, can provide interesting insights on which to reflect and work, at the policy level, in the near future.

How have teachers managed to deal with the emergency by using their digital competence? We assume, based on the current literature and frameworks, that an educator's digital competence goes far beyond technical skills, embracing professional, pedagogical and technological knowledge. Moreover, the opportunities digital technologies offer can go well beyond temporary solutions during the COVID-19 crisis, if teachers

have specific preparation to integrate face-to-face and distance teaching. Here we will first present how digital competence is included in teacher training programs in Italy and Norway, then the main empirical studies published in the two countries on «emergency remote teaching» during the pandemic. Starting from the analysis and comparison of the research results, considerations will be drawn on the digital competence of teachers and on distinct areas of teacher training and education policies in the near future.

1. Emergency remote teaching

In higher education, scholars have framed the new hybrid version of teaching that has emerged due to campus close-downs as «emergency remote teaching». This includes elements from technology enhanced classroom teaching and online teaching context, but cannot be understood as either of those (Hodges et al., 2020; Barbour et al., 2020). In compulsory education, we find similar trends, even if online offerings are less usual. For the school sector, teachers' previous experiences with the use of digital resources and technology enhanced classroom teaching is thus important for schools' capacity to transform into «emergency remote teaching». As observed in the research literature, teaching online must be handled differently than teaching in traditional classrooms.

2. Context description: teacher training and digital competence

In Italy, a university degree in primary school education is a requirement for obtaining teacher qualification at the primary and preprimary levels. Teaching in secondary schools, beside a Master qualification, requires specific competences in anthropology, psychology and pedagogy, as well as in teaching methods and technologies to be acquired through specific university courses. The qualification and the credits are the requirements to access the national open competition that qualifies teachers to the profession.

The general aim of teacher education programs, at all school levels, is the acquisition of subject-related competences as well as of pedagogic, didactic and organizational competences. Teachers at all levels must acquire, among the others, digital competences. The autonomy of schools (Law 59/97) has allowed the experimentation and implementation of good practices based on the use of educational technologies. Over the years, many Italian schools have benefited from EU funds both to equip themselves with technological devices and for teacher training. In 2008, the Italian Ministry of Education launched the National Plan for Digital Education (PNSD) in order to promote digital innovation in the school system. Since then, it has invested systematically to equip schools throughout the country with interactive

whiteboards and internet connections and to provide assistance and training opportunities for their staff. More recently, the PNSD was strengthened and re-launched as one of the pillars of *La Buona Scuola* school reform (Law 107/2015). The new PNSD promotes a systemic vision of education in the digital age through programs and actions organized into five main areas: tools, skills, content, staff training and supporting measures. As far as staff training is concerned, the PNSD aims to strengthen in-service teacher training for organizational and didactic innovation.

As in Italy, also in Norway university degrees are required for teaching in compulsory education. Teacher education programmes are provided by higher education institutions (HEIs) and four main teacher education programmes are offered (NOKUT, 2020). The HEIs follow national guidelines for teacher education. Digital competence addresses teaching practice, focussing on the teacher students' capacity to develop pupils' digital competence. Teacher education programmes are thus expected to contribute to digital responsibility and help counteract a digital divide in schools. Professional digital competence (PDC) is developed across several areas of knowledge and learning areas and includes both general digital competence as well as subject specific PDC and professional knowledge and skills (Kelendric et al., 2017). Teacher education must therefore facilitate the student through various learning activities on campus and in practice, so that they can develop their PDC, but also gain relevant experience in the educational use of ICT in their subjects. Student teachers also need to be able to familiarise themselves with ethical and legal issues such as copyright and privacy issues connected to GDPR (Kelendric et al., 2017). A new national curriculum for compulsory education was implemented in 2020, where digital technologies play a crucial role as a knowledge domain (for example how technology impacts society), and competence. Teacher education programmes have thus started to embed these new dimensions into their offerings.

3. Review of empirical studies about «emergency remote teaching» in Italy and Norway

Literature reviews were conducted in May 2021. The Italian search was done through Google Scholar by setting the following keywords: Italy, pandemic, school, teachers, and the correspondents in Italian. The selection was limited to empirical research conducted with quantitative, qualitative or mixed methods that had been already peer reviewed and published. Studies were included whose results directly concern teachers' digital competence or, at least, allow useful considerations to be drawn on this aspect. Based on these criteria, we found thirteen studies (Tab. 1).

The Norwegian literature review was conducted in a similar manner as the Italian, but with some additional search approaches. We used keywords such as Norway, pandemic, school, teachers, COVID-19, and with a translation of the keywords into Norwegian language. The results included five papers, either Norway as a single case study or as a multi case study with other countries. To supplement, we looked to research reports published by independent research institutes and found five. Findings were either quantitative or qualitative studies, or mixed-method studies. We also identified one Master thesis with a qualitative approach.

When this article is published, the number of available studies for both Italy and Norway will likely be much higher. However, those analyzed in this paper are sufficient to identify some crucial issues with reference to the teacher's digital competence.

TAB. 1. *Studies included in the literature review*

ITALY				
	Title of the research. National/international/local. Reference	*Author(s)*	*Theme*	*Sample*	*Methods and data collecting instruments.*
1	*Didattica a distanza con le famiglie: l'esperienza di insegnanti e genitori, In Italia e in Cina, durante l'emergenza sanitaria 2020.* International. Ardizzoni et al., (2021).	University of Bologna.	How teachers in Italy and China have implemented emergency remote teaching.	Italy: 2,000 pre-school and primary school teachers.	*Mixed methods.* Questionnaire analysis of social networks, focus groups, interviews with parents.
2	*La DaD in emergenza: vissuti e valutazioni degli insegnanti italiani.* National. SIRD (2021).	SIRD, Italian Society for Educational Research.	Emergency remote teaching during the pandemic from the viewpoint of teachers.	16,133 pre-school, primary, middle and high school teachers.	*Mixed methods.* Questionnaire, focus groups and interviews.

3	*La scuola e i suoi esclusi.* National. CENSIS (2020).	CENSIS (Centro Studi Investimenti Sociali).	The Italian school system coping with the pandemic, with particular attention to the theme of technology and digitalization.	2,812 primary, middle and high schools headmasters.	*Mixed methods.* Semi-structured questionnaire.
4	*La didattica durante la pandemia: un'istantanea scattata dagli insegnanti a due mesi dal lockdown.* National. Giovannella, Passarelli, Persico (2020).	University of Rome Tor Vergata and CNR (Consiglio Nazionale delle Ricerche).	Teachers' perceptions about schools' responsiveness and operating conditions immediately after the first lockdown.	336 primary, middle and high schools teachers.	*Mixed methods.* Semi-structured questionnaire.
5	*Technology and didactic innovation in school at the time of COVID-19: an evaluation of the educational effectiveness in the student perspective.* National. Di Palma, Belfiore (2020).	University of Napoli Parthenope.	Assess the effectiveness of remote emergency teaching as perceived by the students.	1,000 high school students (14-19 y.o.).	*Quantitative.* Questionnaire.
6	*Scuole chiuse, classi aperte Il lavoro di insegnanti e docenti al tempo della didattica a distanza.* National. Ferritti (2021).	INAPP - Istituto nazionale per l'analisi delle politiche pubbliche.	Transition from traditional teaching to online teaching from the teachers' perspective.	548 teachers in schools of all levels.	*Quantitative.* Web survey sent via Facebook, Twitter, LinkedIn, WhatsApp and e-mail.

7	*Insegnanti e COVID-19. DAD, benessere psicologico e lavorativo degli insegnanti in tempo di COVID-19.* Local. Matteucci (2020).	University of Bologna.	Teachers' psychological/ occupational well-being and sense of self-efficacy during the pandemic.	1,110 primary, middle and high schools teachers from the Regions Marche, Sardegna and Emilia Romagna.	*Mixed methods.* Questionnaire and semi-structured interviews.
8	*Narrazione di un percorso di formazione durante il lockdown: la DAD del territorio marchigiano.* Local. Ceccacci (2020).	Researcher from the Italian Ministry of University and Research, member of the PNSD.	Teaching during the lockdown and critical areas in the teachers' digital competence.	130 schools and 2,202 pre-school, primary, middle and high school teachers from the Marche Region.	*Qualitative.* Narrative «re-construction» of a training project for teachers.
9	*Testimonianze sull'esperienza DaD: un'indagine in Umbria e Toscana.* Local. Ciurnelli, Izzo (2020).	University of Perugia.	Methods used for remote teaching, evaluation criteria and reflections on positive and negative aspects.	256 respondents among teachers, parents and pupils, mainly from the Regions Umbria and Toscana.	*Mixed methods.* Semi-structured questionnaire.
10	*E-inclusion: online special education in Italy during the COVID-19 pandemic.* Local. Parmigiani et al., (2020).	University of Genova.	Factors affecting e-inclusion and strategies used by teachers to arrange online inclusive teaching/learning activities.	785 teachers from the province of Genova.	*Qualitative.* Questionnaire with open-ended questions.

11	*DAD e inclusione. Uno studio di caso durante l'emergenza sanitaria da COVID-19.* Local. Filosa, Parente (2020).	INAPP.	Analysis of a good practice implemented in a special school for the deaf during the pandemic.	Six participants: headmaster, vice president of parents committee, pre-school coordinator, primary school coordinator, communication assistant (deaf), interpreter (deaf).	*Qualitative.* Case study based on in-depth interviews to stakeholders.
12	*Vo.Ca.Le. (Voice Care Learning).* Local. Santagati, Barabanti (2020).	Università Cattolica del Sacro Cuore Milano.	Effects of the lockdown on school-family relationships during the health emergency.	46 students, 79 parents, 41 teachers of pre-scool, primary and middle school) from the cities of Milano, Brescia and Torino.	*Qualitative.* Interviews via whatsapp vocal messages.
13	*L'educazione ai tempi del Coronavirus (e dopo): risultati preliminari di una ricerca qualitativa condotta con i professionisti dell'educazione.* Local. Chieregato (2020).	University of Bologna.	School/family relationships during the health emergency. Role of educators and teachers to support families.	28 participants, divided in 5 groups: nursery educators; pre-school teachers; coordinators of educational services for 0-6 y.o; primary school teachers; middle school teachers. All from the Emilia Romagna Region.	*Qualitative.* Focus groups.
Norway					
1	*The Coronavirus Pandemic and Lessons*	International Journal of Early Childhood	Effects of the pandemic on preschools in their	Reports from three countries/ areas:	The paper provides little information of the data

	Learned in Preschools in Norway, Sweden and the United States: OMEP Policy Forum. International. Samuelsson, Wagner, Ødegaard (2020).	(2020) 52: 129–144.	countries; teachers' experiences and actions in specific early childhood education settings.	Norway, Sweden and California.	collection which the reports are based upon.
2	*«We Always Make It Work»: Teachers' Agency in the Time of Crisis.* International. Gudmundsdottir, Hathaway (2020).	Jl. of Technology and Teacher Education (2020) 28(2), 239-250.	Teachers' experiences to online teaching in the early weeks of COVID-19 school closures. Previous experiences with online teaching and elaborations on readiness.	1,186 teachers different parts of the world, majority of respondents from Norway and the US.	*Quantitative.* Online survey.
3	*How families handled emergency remote schooling during the COVID-19 lockdown in spring 2020Vuorikari.* International. Velicu, Chaudron, Cachia, Di Gioia (2020).	Publications Office of the European Union, Luxembourg, 2020.	Families' handling of remote schooling during the time of COVID-19 lockdown.	Parents and their children (10-18 years old) from 9 EU countries.	*Quantitative.* Online survey. The sample in all countries reached 500 families.

4	*Norwegian students' experiences of homeschooling during the COVID-19 pandemic.* National. Mælan, Gustavsen, Stranger-Johannessen, Nordahl (2021).	European Journal of Special Needs Education (2021), 36:1, 5-19.	Low, middle, and high-achieving students experiences of home schooling; effort and self-efficacy; experiences and support and feedback from teachers.	1,755 students in 8th to 10th grade from 93 schools in 21 municipalities in Norway.	*Quantitative.* Online survey.
5	*Spørsmål til skole-Norge. Analyser og resultater fra Utdannings-direktoratets spørreundersøk else til skoleledere, skoleeiere og lærere under korona-utbruddet 2020.* National. Federici, Solbue Vika (2020).	Research report. NIFU 13/2020.	Experiences form the school sector with the pandemic.	31 primary schools, 95 upper secondary schools, 9 county municipalities and 99 municipalities . 868 teachers in primary school and 1440 teachers in high school.	*Quantitative.* Online survey.
6	*Nær og fjern. Læreres erfaringer med digital hjemmeskole våren 2020.* National. Fjørtoft (2020).	Research report. SINTEF.	Teachers' experiences during home-schooling. Infrastructure, working conditions, learning environment and professional digital competence.	929 school teachers (primary, secondary, upper secondary).	*Quantitative.* Online survey.
7	*Koronapandem ien i grunnskolen - håndtering og konsekvenser.* National. Caspersen, Holmedahl Hermstad;	Research report. SINTEF, NIFU.	Overview of organisation and management of schooling during the pandemic, views from diverse	Review of previous national studies on impact from school lock down due to the pandemic + 6 new case	*Mixed method.* Online surveys. Interviews.

	Dahler Hybertsen; Lynnebakke; Solbue Vika, Smedsrud; Wendelborg, Federici (2021).		stakeholders (school leader; teachers; pupils).	studies (qualitative interviews with school leaders and teachers).	
8	*Learning from the COVID-19 home-schooling experience: Listening to pupils, parents/carers and teachers.* Local. Bubb,Jones (2020).	Improving Schools, 23(3), 209-222.	Pupils, parents and teachers' experience home-schooling. School leaders' plan to change.	Teachers, parents, pupils (6-9; 10-16) school leaders in one municipality.	*Quantitative.* Online survey.
9	*Kids' Digital Lives During COVID-19 Times Digital practices, safety and well-being of 6- to 12-year-olds – a qualitative study.* Local. Letnes, Veelo, Stänicke, Indrevoll, Ní Bhroin,Rasmussen (2021).	Research report.	Digital technologies, including parents' and children's perspectives on remote schooling, online risks, screen-time regulations during the lockdown.	Interviews with 15 families with children ages 6 to 11 years old. Two municipalities.	*Qualitative.* Interviews.
10	*Oslo-ungdom i koronatiden. En studie av ungdom under COVID-19-pandemien. NOVA, OsloMet.* Local. Bakken, Pedersen, von Soest, Sletten, (2020).	Research report. OsloMet.	Students report on wellbeing and experiences of home schooling.	12,686 students in Oslo municipality.	*Quantitative.* Online survey.

11	*Læreres syn på undervisning og læring i spenningen mellom 1:1-klasserommet og avstands-klasserommet.* Local. Skotnes Kleiven (2020).	Master thesis. University of Oslo.	Teachers' pedagocal beliefs in physical classrooms and in homeschooling.	8 school teachers.	*Qualitative.* Interviews.

4. Main themes that emerge from the studies

The OECD study *Learning remotely when schools close* (2020) can be considered a secondary source for our research, since it analyzes 2018 PISA data in order to draw useful considerations on emergency remote teaching and learning during the pandemic. PISA 2018 asked school headmasters[1] about different aspects of their school's capacity to enhance teaching and learning using digital devices. Across OECD countries, 65% of 15-year-olds, at the time the survey was administered, were enrolled in schools whose headmasters considered that their teachers had the necessary technical and pedagogical skills to integrate digital devices in instruction. Italy scored significantly below the average (50%), while Norway significantly above (75%). In Norway, this percentage varied considerably between socio-economically advantaged and disadvantaged schools, so to suggest that schools may reinforce rather than moderate the disadvantage that comes from individual home backgrounds. Across OECD countries, about 60% of 15-year-old students were enrolled in schools whose headmasters considered that teachers had sufficient time to prepare lessons integrating digital devices. Italy scored slightly below the average, while Norway was significantly above. The OECD general picture looked similar when it came to the availability of effective professional resources for teachers to learn how to use available digital devices. However, both Italy and Norway were significantly above the average.

In summary, the photograph taken by OECD PISA a few years ago shows that Norwegian schools and teachers were already more prepared and better equipped for remote teaching than Italians. However, in Italy, as well as in Norway, before the pandemic teachers had professional resources at their disposal to learn how to use new technologies for teaching.

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[1] The data were collected as part of the global PISA assessment in 2018, and are based on representative samples from 79 education systems involving over 600,000 15-year-olds.

4.1 Digitalization of schools

The pandemic emergency highlighted serious gaps in the digitization of the Italian schools and wide disparities between «strong» schools, with previous experience, good technological equipment and teachers trained in the use of the new technologies and schools that were first entering the digital world at the time the pandemic begun. According to CENSIS (2020), less than 50% of the school headmasters who participated in a national survey declared that all teachers in their school were involved in remote learning. Teachers' inactivity, according to them, amounts to an average of 5%. Only 11.2% of the headmasters declared that all their students were involved in online teaching. If, on the one hand, the introduction of distance learning contributed to «decrease» the resistance to the new technologically enhanced learning tools, on the other hand it highlighted all the limitations and obsolescence of the Italian school system, starting from the infrastructural and cognitive digital divide (Filosa, Parente, 2020). National and local studies emphasise that some teachers also did not have devices and applications at their disposal that were sufficiently powerful to set up effective teaching strategies (SIRD, 2021; Parmigiani et al., 2020).

Norway has a strong broadband capacity, and an overall national digital infrastructure for education. This includes for example a national solution for secure login and data sharing in the educational and research sector. Furthermore, about half of the schools in the country provide their students with individual digital devices, such as iPads, Chromebooks or PCs, with the best coverage for older children (Skaftun, 2018). Moreover, most homes are equipped with at least one digital device with internet access. Another observation would be that for years several efforts have been made to ensure teachers raise their digital proficiency, such as strengthening the national curricula to include digital competence. The municipalities have conducted systematic competence development procedures at their teacher staff to enhance their professional digital competence. However, most of these activities have been conducted in traditional classroom contexts, and with only limited online activities. Nonetheless, Norway's overall digital infrastructure and capacity to meet the challenges related to homeschooling was apparently looking promising.

4.2 Technologies, teaching strategies and digital competences

In emergency, traditional/transmissive teaching strategies prevailed over interactive ones in Italian schools (SIRD, 2021). Teachers were not able to remodel the training proposal and therefore used methodologies that were not adequate to distance learning (Ardizzoni et al., 2020). According to a national study (Di Palma, Belfiore, 2020), when students were asked if professors had adapted their lessons to the online mode, over 36% of them replied negatively. The teachers' will to maintain the relationship with students was stronger than the thrust to study and learn new methodologies (CENSIS, 2020). According to a local study (Ciurnelli, Izzo,

2020), most teachers (61,1%) proposed remote activities starting from the first week of lockdown, despite the fact that 11% of the teachers did not have platforms shared with students or multimedia materials available. The proposed activities were of various kinds, but in most cases teachers offered a traditional lesson transposed to online mode (25.2%), or sent self-produced materials or materials found on the web (20.7%).

The constructive attitude of the teachers allowed them to manage online teaching across platforms, applications and digital materials largely unknown until then. However, the lack of knowledge of educational technologies for teaching impacted on the quality of the learning process. Teachers' perception of effectiveness was not proportionate to the increased workload. The main perceived criticalities concern the impact of remote teaching on learning, the quality of interactions and communication, the students' autonomy in learning, inclusion and assessment (SIRD, 2021).

In Norway, teachers reported little, or no experience with remote online teaching prior to the pandemic, yet most were quite positive about their professional development (Federici, Solbu Vika, 2020; Samuelsson, 2020; Gudmundsdottirand Hathaway, 2020).

Before the school close-down, many schools had some experience with digital home-school collaboration (Fjørtoft 2020; Gudmundsdottir, Hathaway, 2020). However, when it comes to teachers' professional digital competence, findings from an international teacher survey suggest that technical skills rather than competence in digital teaching was reported from the Norwegians respondents (Gudmundsdottir, Hathaway, 2020). There was also great variation in the frequency of real-time online classroom teaching students received within a week (Federici, Solbu Vika, 2020; Mæland, 2020; Fjørtoft, 2020), and teachers reported an increased workload due to this new way of teaching (Caspersen et al., 2021).

The teaching offerings during the close down thus deepened on teachers' digital competence (Fjørtoft, 2020). A local study found that families' experiences with how the teachers required daily attendance from their students varied, yet creative learning, better progress, useful feedback and greater student independence were reported. Here, school leaders reported that they wanted to implement changes based on the experience of remote learning enforced by the lockdown, so that the crisis has become an opportunity for grassroots innovation (Bubbs, Jones, 2020).

4.3 Students' digital competence and equipment

In Italy, the impossibility of having direct contact with students forced teachers to resort to different tools for communication and teaching. The choices of the teachers were impacted not only by their own competence, but also by the different equipment, accessibility and familiarity in the use of the tools by students and their families, acting as mediators, especially at the lower levels of education. Teachers reported technical

issues in communicating with pupils and in the perception of their effective participation in educational activities, in addition to problems deriving from the inadequate support provided by families. More than ¼ of the students who participated in a research conducted at the University of Napoli Parthenope (Di Palma, Belfiore, 2020) declared that they did not possess the necessary technological resources for learning remotely. More than 35% of them declared not to have a computer available for them at home.

In Norway, the national monitoring of the schools sector's response to the pandemic revealed that teachers' experienced complex challenges around teaching in the remote online classroom, where the students often had higher technical competence. For teachers with a dialogue oriented pedagogical approach, student's digital competence was considered helpful, as they could assist with some technical support, while teachers with a more traditional approach as content providers and with less experience with technology enhanced teaching were less enthusiastic (Caspersen et al., 2021).

4.4 Assessment

Italian teachers reported many difficulties in this area (SIRD, 2021). Remote assessment brings with it many necessary changes, because on the one hand it implies the use of different tools, on the other hand it requires a redefinition of the evaluation criteria. According to a local study (Ciurnelli, Izzo, 2020), methods of assessment changed deeply. More than half of the teachers who participated in the research (59%) feel quite satisfied with the results (level 3 of 5), but parents are less satisfied (from 1.9 to 2.7 average). More than 80% of parents with kids 6-18 y.o. believe that evaluation criteria were not made clear and 75% of them believe that the only criterion was presence at online classes. Students don't confirm this: 69% say they were informed about evaluation criteria and about 80% of them express a level of satisfaction between 3 and 4.

Many Norwegian teachers reported that much extra time was spent on making preparations and on giving feedback to students. The students had more submissions than normal. The more frequent submissions replaced that teachers could not walk around the classroom and follow up on students while they worked. Some teachers thought that the increased time for feedback was manageable, for example, one teacher emphasized that the time spent on socialization in the classroom was replaced with more professional feedback (Fjørtoft, 2020).

Students (grade 8th-10th) reported to get more feedback in general from their teachers in regular school than home-schooling, and the format of the feedback changed to more written and less oral during home-schooling. High-achieving students reported the greatest change during homeschooling (Mæland et al., 2021).

4.6 Educational poverty

In Italy, the distance has increased anxieties, frailties and inequalities and, often, left behind children and families with special needs. According to SIRD (2021), the estimated percentage of students who were not reached by emergency remote teaching is between 6-8%, that of the partially reached is 16-18%. In pre-school 13% were not reached and 24% were only partially reached.

Studies from Norway revealed an overrepresentation of students from lower socio-economic background among those who did not have good enough digital equipment/internet access at home (Fjørtoft, 2020; Bakken et al., 2020). A study from Oslo also found that immigrant youth were overrepresented here, which in turn seems to reflect socio-economic differences (Bakken et al., 2020).

Conclusions: implications for teachers training

The emergency of the pandemic, while causing great inconvenience, has provided an important opportunity for reflection on the digital competence of teachers.

In Italy, the training system for future teachers, especially for secondary schools, is still weak and digital competence is not systematically embedded in the curriculum. Several policies have addressed the theme of digital innovation in schools for the last two decades, but the results are still poor and very diverse throughout the territory. Some of the empirical research results discussed in this paper may suggest that the Italian shortcomings in the use of digital technology for teaching stem, in part, from a sort of «cultural resistance» generated by a lack of sensitivity and interest in this subject, which should instead be stimulated in initial teacher education programs and through in-service training. The experience of the pandemic has helped to decrease such a resistance, improving comfort and perception of self efficacy in the use of the new technologies for teaching. Several studies have reported that teachers plan to continue integrating the digital skills acquired during the pandemic into their teaching practice, even in a condition of restored normality. It is therefore crucial to introduce digital pedagogy in a systematic way in teacher training curricula.

While the digital infrastructure is considered well functioning in Norway, and digital competence for teachers has been on the (political) agenda for years, teacher's digital competence still remain unevenly distributed in schools, as well as in teacher education programmes. A key finding from Norway is that most teachers in Norway report to have improved their digital competence during the pandemic. However, we still do not know so much if they have become more technically competent, or if they have changed their pedagogical approaches. While some teachers may have managed to use technology in their teaching for the first time, to reach out to students from the online platforms in use,

and from there obtained self efficacy as described in the case of Italy, others may have been experimenting with new and innovative pedagogical approaches in online contexts. The spectrum of digital competencies may thus have evolved for most teachers, but in which ways, and to what extent remain unknown.

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