THE ROLE OF TECHNOLOGY AT SCHOOL: NEW PERSPECTIVES ON DISTANCE EDUCATION AND CYBERBULLYING

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ABSTRACT

The integration of digital technology in school is a complex phenomenon that affects both teaching and peer relationships. Accordingly, the main aim of this dissertation was to investigate the implementation of distance education among Italian teachers during the COVID-19 pandemic and analyze peer relationships concerning cyberbullying and bullying. While the theoretical section provided an overview of the phenomena, four empirical studies were presented. The first one tested a moderated moderation model among 178 secondary teachers on the interactions among perceived usefulness, perceived ease of use of technology and online teaching self-efficacy. Findings showed that each variable significantly predicted the intention to use technology. In addition, a moderation effect of online teaching self-efficacy on perceived usefulness was found. The second study analyzed the differences in factors promoting the integration of digital technology among 357 teachers of different levels and subjects and their positive and negative experiences with distance education. Results revealed several differences in the function of the grade and subjects taught. Moreover, four main themes emerged from the content analysis. The third study investigated the dyadic perception of bullying and cyberbullying among 50 students using the eye-tracker. Findings showed that, despite differences among different kinds of bullying and cyberbullying, the victim and bully were the most observed roles. Finally, the last study tested two multiple mediation models among 563 students on the association between bullying, cyberbullying, and well-being, considering three different variables related to the school context (peer network, teacher support and school connectedness). The results highlighted the importance of peer networks and school connectedness in mediating the association between victimization, cybervictimzation and well-being. Taken together, the findings provided a rich overview of digital technology integrationin schools, highlighting positive and negative aspects and its implications for future research and school policies.

DECLARATION

I I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university

2. and the research within will not be submitted for any other future degree or diploma without the permission of Flinders University & The University of Bologna; and

 3. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text

Signed...

Date: 16th November

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When I think about my Ph.D. journey, the first thing that comes to mind is the colorful repertoire of different emotions I felt over the past three years. The happiness of the beginning, the frustration of not understanding certain statistical analyses (it persists, of course), the joy for the first published article, the love I feel for the people I work with, and the dedication I feel for research. Luckily, I have never been alone; throughout my academic career, Professor Annalisa Guarini was there for me both in good times and in bad, believing in me and inspiring me. Annalisa, I am eternally grateful to you.

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CHAPTER 1
GENERAL INTRODUCTION

School represents one of the central settings that affects students' development, where students have many experiences at academic, relational, and emotional levels with teachers and classmates (Newman, 2000; Oelsner et al., 2011; Rubin et al., 2006; Tobia & Marzocchi, 2015). According to Bronfenbrenner's ecological systems theory (1979), our environment plays a significant role in all aspects of our lives. Social factors influence what we think and how we feel. In this context, school represents a crucial microsystem of development, where students spend a great deal of time interacting with teachers, peers, and school personnel.

However, it is important to remember that school is not a static system but is affected by changes that occur socially and in the world.

One of the most significant changes that have taken place in the past 20 years worldwide undoubtedly concerns the impact of technology on our lives (Barak, 2017; Navarro & Tudge, 2022; Plowman, 2019; Ratheeswari, 2018). Overall, technology use falls within the ICT (Information and Communication Technology) field. According to UNESCO (2009), ICT can be defined as:

"forms of technology that are used to transmit, store, create, share or exchange information. This broad definition of ICT includes such technologies as: radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing and electronic mail" (p.120).

Concerning ICT, education is now facing major challenges: on the one hand, it is expected to apply and integrate ICT in teaching (Ilomäki & Lakkala, 2018; Romeo et al., 2013); on the other hand, it is called upon to address and describe new forms of aggression among students perpetrated in online environments through the use of ICT (Beale & Hall, 2007; Brendgen & Troop-Gordon, 2015). Furthermore, the effects of

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COVID-19 have made these challenges even more urgent (Barlett et al., 2021; Giovannella et al., 2020).

Indeed, although distance education was the only means for teachers to continue the educational path and keep alive their relationships with students, the forced switch to an online environment during pandemic restrictions fueled many concerns about the implementation of distance education like doubts about its effectiveness and lack of expertise in teachers' use of technology (Ewing & Cooper, 2021; Giovannella et al., 2020; Koçoglu & Tekdal, 2020; Pellegrini & Maltinti, 2020; Turner et al., 2020). Moreover, in a development period normally characterized by the desire for autonomy and peer connection (Brown & Larson, 2009), adolescents had to stay at home, away from friends and classmates, and could not continue their daily activities as they had pre-pandemic, so that technology became the only means of communication. While technology has become an important resource, its prolonged use has renewed interest in forms of online aggression, such as cyberbullying, fueling questions about the role of schools in online environments (Barlett et al., 2021; Dennehy et al., 2020; Shin & Choi, 2021; Utemissova et al., 2021; Yang, 2021).

Therefore, the purpose of the present thesis was to investigate, from multiple perspectives, the influence of technology in the school system in Italy, in relation to teaching and peer relationships by conducting four different, but related, studies.

1.1 Research Problem

1.1.1. Teaching and Technology

Regarding the educational process, although ICT integration is considered an integral part of teaching (Pandolfini, 2016; Salmieri, 2019), a great deal of research has shown that teachers do not often integrate it into their lessons (Güneş & Bahçivan, 2018; Tondeur et al., 2018) with important differences occurring even among the European countries. Indeed, surveys on pedagogical innovation and teachers' professional

development (OECD, 2010, 2014, 2019) have shown that Italy, for example, has lagged behind most European countries concerning the quality and usage of technology in schools (Calvani, 2013). Moreover, the problem of incorporating technology in teaching became even more evident during COVID-19, when many Italian teachers expressed doubts and uncertainties regarding the implementation and effectiveness of distance education (Giovannella et al., 2020; Pellegrini & Maltinti, 2020).

The difficulty with integrating technology into teaching is not a problem just for the Italian teachers, who are increasingly required to do so, but also for the Italian educational system itself. Indeed, the European Commission (2016) stated that digitalization represented a driving force in economic productivity, encouraging member states to foster the development of new digitalized learning environments to ensure the national education systems of European countries stay up to date (Salmieri, 2019). However, although the study of school technology integration is a widely analyzed topic, some gaps in the research still need to be addressed

The first gap is at the theoretical level. The Technology Acceptance Model (TAM, Davis, 1993) is one the most cited theoretical models used to explain reasons that may lead to the use of technology. TAM postulates that technology usage is determined by the behavioral intention to use it. In particular, perceived usefulness and perceived ease of use are relevant for technology acceptance behaviors (Wahid, 2007). The TAM model has been applied and validated in predicting the use of technology in education settings among teachers and pre-service teachers (Teo, 2011). However, two main difficulties have yet to emerge. First of all, many authors have recognized that perceived ease of use and perceived usefulness do not sufficiently explain the use of technology, highlighting the need to introduce and consider other factors to understand better technology integration (Maruping et al., 2017; Venkatesh et al., 2003). In this respect, online teaching self-efficacy has been found to be particularly important for the use of technology among teachers (Fanni et al., 2013; Krumsvik, 2011; Tondeur et al., 2009) as those who have high online self-efficacy levels tend to be more successful in the technology integration process (Wang et al., 2004). Secondly, TAM has been mainly

used to investigate the acceptance of technology among higher education teachers or students (Park et al., 2012; Persico et al., 2014) and among pre-service teachers (Acarli & Saglam, 2015; Teo, 2008) with little attention to teachers in lower year levels schools, especially in the Italian context. In this regard, to the best of my knowledge, the first study presented here (Chapter 3) is the first to consider how online teaching-self efficacy could interact in new ways with the perceived ease of use and perceived usefulness to promote the intention to use technology among Italian upper secondary school teachers during the spread of COVID-19.

The second gap concerns the need for more attention to how personal factors promoting technology integration could vary in the function of teachers' different grades and subjects. Indeed, studies conducted before the spread of COVID-19 that analyzed differences in the perception and willingness to integrate technology based on different teachers' grades and subjects showed interesting results, for example, a lower tendency to integrate technology among kindergarten and primary teachers than those among secondary schools (Antonietti & Giorgetti, 2006; Cordes & Miller, 2000; Magen-Nagar & Firstater, 2019). During the spread of COVID-19, however, only a few published works have evaluated the differences in the willingness to integrate technology among teachers of different grade levels and subjects, showing contrasting results (Alea, et al., 2020; Giovannella et al., 2020; Scarpellini et al., 2021). In addition, these studies highlighted some issues. The first one is the need for more involvement and comparison with pre-service teachers despite their importance as future educators. The second one concerns the few variables that these studies have examined. Literature has revealed numerous factors whose level may differ among teachers of different levels of and subject, like the technology skills, technology for pedagogy, the ICT facilitating conditions, the perceived usefulness and the perceived ease of use of ICT, the behavioral intention to use technology, the online teaching self-efficacy and teaching self-efficacy. However, no studies have examined all these factors together about different teachers' grades and subjects and including pre-service teachers, during the spread of COVID-19.

The third and final gap is at the methodological level, and it concerns the need to extend the study of distance education in teachers during COVID-19 with qualitative methods. Qualitative methods represent a significant added value allowing the exploration and interpretation of individual experiences using teachers' own words (Kebritchi et al., 2017). Before the COVID-19 pandemic, qualitative studies investigating the implementation of ICT in teaching were mainly conducted in tertiary education (for a literature review, see Carrillo & Flores, 2020), while literature concerning primary and secondary teachers was scarce. With the advent of COVID-19, some studies have examined distance education in primary and secondary schools using a qualitative approach (Atmojo & Nugroho, 2020; Hebebci et al., 2020; Niemi & Kousa, 2020; Sari & Nayır, 2020). However, none of them investigated positive and negative experiences regarding the implementation of distance education among Italian teachers. In addition, these studies involved a low number of participants, limiting the possibility of different views. Thus, the second study in the dissertation (Chapter 4) sought to address both the second (i.e., factors associated with technology integration could vary among teachers of different orders and subjects) and the third issue (i.e., lack of study focusing on qualitative data). Indeed, on the one hand, it is considered how all the aforementioned factors could vary among different teachers of different subjects and grades, including preservice teachers, while, on the other hand, it is the first study to examine, at a qualitative level, positive and negative experiences of a large sample of Italian teachers during the spread of COVID-19.

1.1.2. Peer Relationships and Technology

The use of ICT has a profound impact not only on the teaching process but also on how students interact. Indeed, technology has enabled bullying to escalate to a new and particularly insidious level, namely cyberbullying (Smith et al., 2008). Bullying and cyberbullying constitute serious public health issues that impact the general sense of student well-being in many ways since they have been associated with an increase in

symptoms of low self-esteem, depression, and anxiety (Brighi et al., 2012; Kowalski & Limber, 2013), including suicide in extreme cases (Hinduja & Patchin, 2010). Bullying and cyberbullying are both considered social phenomena; (Baldry et al., 2019, Salmivalli & Voeten, 2004) and, given their social nature, the school represents the most significant environment where bullying and cyberbullying often arise and are reinforced (Zych et al., 2019). However, despite the many steps forward in studying bullying and cyberbullying, gaps in their understanding still need to be addressed.

The first gap relates to students' comprehension of bullying and cyberbullying as peer-group phenomena. Indeed, as mentioned before, bullying and cyberbullying are social phenomena that involve several actors. Specifically, peers play a crucial role in initiating, maintaining or stopping the bullying. In this respect, research has identified numerous roles involved in bullying and cyberbullying dynamics beyond the bully and the victim (pro-bully, passive bystander and defender, Salmivalli et al., 1996). However, research conducted with qualitative and quantitative methods has shown that students often considered bullying and cyberbullying as dyadic phenomena in which the only roles are the victim and the bully (Bosacki et al., 2006; Guarini et al., 2019). Since the awareness of bullying and cyberbullying as social phenomena could change how students decide to behave, increasing the likelihood of defending the victim (Haataja et al., 2015), the study of how students perceive bullying and cyberbullying (dyadic vs. social) is essential. Unfortunately, both qualitative and quantitative methods, already used in previous studies, present important limitations. Indeed, when completing a questionnaire, students may underreport their involvement or answer socially acceptable ways (Berne et al., 2013; Rigby & Johnson, 2006). Concerning qualitative research, data analysis may be too flexible or not well formulated (Silverman, 2013). Therefore, it could be worthwhile to investigate deeper the perception of bullying and cyberbullying phenomena by widening the study methods. Among various techniques, the eye-tracking method is gaining increasing attention. Eye tracking is a validated method to study participants' attention with milliseconds precision based on the "eye-mind" hypothesis proposed by Just and Carpenter (1980), which asserts that eye movements provide dynamic

feedback regarding where attention is being directed. Thus, continuous recording of eye movements provides the most direct measure of attention and is thought to be less affected by confounding processes (Oar et al., 2022). Over the years, eye-tracking has been widely applied to the study of cognitive processes and emotional responses (Giacomantonio et al., 2018; Guarini et al., 2019; Koornneef & Vanberkum, 2006; Troop-Gordon et al., 2018). However, despite the many benefits, like the possibility to study attention with millisecond precision and non-invasive, eye-tracker has rarely been used in relation to complex phenomena, such as bullying and cyberbullying. The third empirical study in the present dissertation (Chapter 6) proposes an explorative study to investigate students' perception of the different roles involved in bullying and cyberbullying using the eye-tracker. To the best of my knowledge, this is the first study to investigate the social perceptions of bullying and cyberbullying using a behavioral method and expanding research on this topic.

The second gap concerns how school factors, beyond just the peer group, could mediate the relationship between bullying, cyberbullying and well-being and if their impact could vary in importance between bullying and cyberbullying. Indeed, as mentioned before, bullying and cyberbullying are associated with a decrease in a general sense of well-being. In this regard, many previous studies have shown the importance that school factors could have in mediating these relationships (Du et al., 2018; Jenkins et al., 2018; Villalobos-Parada et al., 2016). Specifically, the classroom environment represents a crucial place for developing relational skills and promoting well-being due to the significant amount of time students spend interacting with peers and teachers in this microsystem (Bronfenbrenner, 1979; Ladd, 2003). Many studies have shown how good relationships with peers and teachers could mediate the effect of bullying and cyberbullying on well-being (Chen et al., 2021; Hu et al., 2022; Jenkins et al., 2018). However, it is still unclear if these variables could play important roles as mediators with the same impact on bullying and cyberbullying (Kim et al., 2019). Beyond the direct relationship with peers and teachers, previous studies also demonstrated that the feeling of connectedness with own school plays a crucial role in increasing or decreasing peer

victimization (Gendron et al 2011; Unnever & Cornell, 2003; Wang et al., 2013). However, research has shown mixed results and it is unclear if school connectedness could also have the same importance in cyberbullying (Holfeld & Baitz, 2020; Wormington et al., 2016). The fourth and last study (Chapter 7) sought to address this gap. Indeed, two parallel multiple mediation models were tested, considering the teachers' support, the relationship with peers and school connectedness as mediators in the relationship between bullying, cyberbullying and well-being. To the best of my knowledge, this is the first study to investigate the associations between victimization, cybervictimization and well-being, considering the simultaneous presence of the three mediators in a sample of Italian pre-adolescent students, offering the possibility of new insights into good practice and policies.

1.2. Research Questions

Starting from these premises, the present dissertation tries to shed light on the abovementioned issues, presenting four different empirical studies and adopting different methods. Therefore, the dissertation set out to address the following research questions:

1)   How could perceived usefulness and ease of use from the TAM model interact with online teaching self-efficacy to foster behavioral intentions to use technology among Italian upper secondary school teachers during COVID-19?

2)   Do the variables promoting technology integration in teaching differ on the school grade and subjects taught among Italian school teachers during COVID-19?

3)   What were Italian teachers' experiences and thoughts, positive and negative, regarding distance education during the COVID-19 pandemic?

4)   What is the social or dyadic perception of bullying and cyberbullying among students assessed through the eye-tracker?

5) What impact can school factors (relationship with peers, teacher support, and feeling of connectedness to the school) have in mediating the relationships among bullying, cyberbullying and well-being?

1.3. Thesis outline

The present dissertation is organized into two sections. The first section (Chapters 2, 3, 4) focuses on the study of the implementation of distance education among Italian teachers, while the second section investigates bullying and cyberbullying (Chapters 5, 6, 7).

1.3.1. Distance Education Section

Chapter 2: The second chapter provides a theoretical framework for distance education, illustrating its history, reviewing factors promoting technology integration and framing the studies within the Italian context.

Chapter 3: The third chapter presents a modified version of a published study (Menabò et al., 2021) that examined how some of the individual factors illustrated in Chapter 2 (perceived usefulness, perceived ease of use, online teaching self-efficacy) could interact in new ways to explain the implementation of distance education during COVID-19 (Research Question 1). The model was based on the original TAM model that highlights the importance of perceived usefulness and perceived ease of use in promoting the integration of technology. However, online teaching self-efficacy was added in line with the recommendation on research on TAM, adding new variables and interactions (Granic et al., 2019).

Specifically, the aim was to test a moderated moderation model proposing that the perceived usefulness of technology influenced the intention to incorporate it into teaching. However, this relationship was moderated by online teaching self-efficacy, which in turn was moderated by the perceived ease of use of technology. The model was

tested through multiple regressions with 178 upper secondary school teachers in Italy. Results showed that each variable significantly predicted the intention to use technology. In addition, a moderation effect of self-efficacy on the perceived usefulness of using technology was found for medium and high-level of perceived ease of use. By contrast, when self-efficacy was high, the intention to use technology was not affected by different levels of the perceived usefulness of technology.

Chapter 4: The fourth chapter consists of a modified version of a published study (Menabò et al., 2022) presenting a two-fold aim. Indeed, the first aim was to investigate if variables promoting distance education (teaching self-efficacy, online teaching self-efficacy, facilitating conditions, perceived ease of use, basic and advanced technology skills, technology for pedagogy and behavioral intention to use technology) would differ among Italian teachers of different grades and subjects (Research Question 2). The second aim was to explore personal feelings and thoughts related to the implementation of distance education during the spread of COVID-19 (Research Question 3). Thus, 357 Italian teachers of different grade levels and subjects filled out an online questionnaire including validated scales and two open-ended questions about the positive and negative aspects of distance education. Findings indicated that teaching self-efficacy was greater in pre-service and primary teachers while facilitating conditions were greater in humanities and science secondary teachers. The perceived ease of use of technology and technology for pedagogical skills were more pronounced among science secondary teachers. Advanced technology skills were lower in humanities secondary teachers, while the behavioral intention to use technology was greatest among pre-service teachers. Four themes emerged from the qualitative analysis of teachers' insights. These included positive and negative aspects of using technology, the relationship with students, the versatility of distance education, and the quality of lessons.

1.3.2. Peer Relationship Section

Chapter 5: The fifth chapter presents a narrative review of the bullying and cyberbullying phenomena. This includes definitions, focusing on the similarities and differences between bullying and cyberbullying, the impact on well-being and the importance of other roles in reinforcing or stopping peer aggression.

Chapter 6: Chapter six presents results from a study using eye-tracker methodology. The purpose was to understand how attention was being paid to the different roles co-involved in the dynamics of bullying and cyberbullying (Research Question 4). The sample consisted of 50 Italian students attending lower secondary schools. In creating the stimuli, a professional artist was specifically hired to draw 12 different scenes of bullying and cyberbullying (three for physical bullying, three for verbal bullying, three for relational bullying and three for cyberbullying). All roles (bully, victim, pro-bully, defender, and bystander) were represented in each scene and the scenes were gender-balanced. The different roles in each scene were considered a separate Area of Interest (AOI), namely the chosen portions of the displayed stimuli that allow extracting the attentional indexes. The attentional indexes considered were fixation counts (number of times the participant fixates on a role), visit counts (number of times the participant visits a role), and the total fixation duration (total duration for all fixations in a role per milliseconds).

Results showed that the victim and bully were the most observed roles. The defender was particularly observed in physical bullying and cyberbullying, while the bystander received greater attention in psychical, relational and verbal bullying.

Chapter 7: The seventh chapter presents a study of two mediation models. Specifically, the study relied on the Social-Ecological framework to examine how peer networks, teacher support, and school connectedness could mediate the relationship between victimization, cybervictimization and well-being (Research Question 5). To address the research goal, two mediation models were developed, considering respectively victimization and cybervictimization as predictors, well-being as the outcome, and peer networks, teacher support, and school connectedness as parallel mediators in both models. In addition, gender was used as a covariate variable. The sample consisted of 563 students attending lower secondary schools in Italy. Results

showed that the two models were significant both for victimization and cybervictimization. In relation to the direct effects, victimization and cybervictimization did not reveal a significant impact on well-being, while both predictors presented significant effects on peer networks, teacher support, and school connectedness. Concerning the indirect effects, victimization and cybervictimization showed significant effects through peer networks and school connectedness, while teacher support did not mediate the relationship in any of the proposed models. Thus, the relationship between victimization and cybervictimization and well-being was fully mediated by the effect of peer networks and school connectedness.

Chapter 8: This is the final chapter of the thesis that summarizes the results. Specifically, the last chapter is organized into different sections. In the first section, different theoretical perspectives on the integration of technology at school, cross-cutting teaching and peer relationships, are provided. The second section delves into the data collection and analysis methods, emphasizing how different methodologies were selected based on the research objectives. In the third part, potential practical implications are discussed in light of the reached findings. Finally, the last section concerns the limitations of the thesis and suggestions for future research.

CHAPTER 2
DISTANCE EDUCATION

The first research on distance education can be traced back to 1926 when John S. Noffsinger, secretary of the National Home Studies Council, recorded the first systematic description of American correspondence study (Black, 2018; Moore, 1987). It was with the advent of television around the 1950s, however, that distance education began to be more widespread. For example, in 1960, the Correspondence Study Division (CSD) and the National Home Study Council (NHSC) collaborated on the Correspondence Education Research Project (CERP), a national survey of correspondence study in higher education in the United States. The CERP study reported the first evidence that correspondence education had similar effectiveness to face-to-face classes (MacKenzie et al., 1968). Thus, from the second half of the 20th century, interest in distance education has grown significantly, also sustained by the implementation of educational reforms and socio-economic justification for distance education, especially in developing countries. Indeed, most developing countries saw distance education as a way to distribute information, new ideas and attitudes that could spread through the layers of the poorest environments (Shah, 1989). Pakistan and India, for example, provided low-cost literacy and job training instruction through a combination of modern teaching methods and emerging technologies so that in the early 1980s, a record number of students in developing countries gained access to higher education through distance education programs (Rumble & Harry, 2018).

However, technology and evolving systems for delivering information were the real drivers of distance education's spread (Benke, 2020). Indeed, due to its cost-effective capacity to reach a mass audience physically distant with the use of technology, distance education was offered not just in developing countries but also in the industrialized ones. In Europe and other western countries, the growth of distance education resulted in the development of many centers for distance education research, like the Institute of Educational Technology (IET) at the OUUK; the Education Center of Berlin and the

Centre for Distance Education (CDE) at Athabasca University, Canada. European Association of Distance Teaching Universities.

2.1. Definitions and Generations of Distance Education

Originally, UNESCO (2002) defined distance education as:

"Any Educational process in which all or most of the teaching is conducted by someone removed in space and/or time from the learner, with the effect that all or most of the communication between teachers and learners is through an artificial medium, either electronic or print" (p. 22).

Scholosser and Simonson (2009) formalized distance education as "institution-based, formal education where students are separated from their instructors, and interactive telecommunications systems connect them to resources and instructors" (p. 4). Over the years, other authors defined distance education as a type of education that uses one or more technologies to provide instructions to students who are separated from the teachers as well as to create opportunities for teachers and students to collaborate frequently synchronously or asynchronously (Allen & Seaman, 2017; Pedro et al., 2018; Seaman et al., 2018). Regardless of its definition, distance education consists of four main components: it is institutionally based, separates students from teachers, uses telecommunications for communicating over distance via electronic or non-electronic means, and enables students to connect with resources and teachers (Martin et al., 2022). Therefore, distance education is based on the underlying premise that a specific technology or group of technologies are being used to overpass the distance between teachers and students. (Schearer, 2008).

To categorize distance education into new technologies, Moore and Kearsley (2011) proposed a five-generation theoretical framework of distance education (Table 1). The first generation of distance education relied primarily on written and printed texts and

postal services to deliver newspapers, books, and manuals. It is the so-called print-based correspondence education. Teacher-student interaction was usually limited to correspondence, which consisted of handwritten texts sent via postal mail. Since student evaluations were usually summative and were left at the end of the course, it was not easy to assess student learning in this mode (Aoki, 2012).

Next came the second generation. In addition to print materials, television and radio were used as instructional media. It is often referred to as the "industrial mode" of distance education, as it relied on highly specialized divisions of labor to produce and deliver instructional materials and educates thousands of students simultaneously. A large number of open universities in the world began as this second generation of institutions as well. Television and radio were chosen as the broadcasting media when those institutions were established since they could easily reach mass audiences and matched open universities' mission to expand educational opportunities (Aoki, 2012).

Distance education has reached its third generation using ICT. In this reagard, two aspects characterized the interactivity of the use of ICT: the interactivity between the learner and the content as seen in interactive multimedia learning materials on the Web and the interactivity between teachers and students and among students. By utilizing immersive digital technologies, the fourth generation could deliver voice and video communication via the internet through synchronous and asynchronous means (Anderson & Dron, 2011).

Essentially, the fifth generation of distance education builds on the fourth generation, which takes advantage of the web's latest capabilities. like the possibility of using school and university portal access to institutional processes and resources and the fact that a stationary computer is no longer required to access distance education (Aoki, 2012). In addition, the fifth generation of distance education no longer needs stationary computers as content can be displayed on a tablet, a smartphone, or a laptop, making the use of distance education more and more viable and accessible (Pregowska et al., 2021). Moreover, the creation of new social software, which enables groups of people to interact online, gave new possibilities to distance education. Indeed, using social software and

other collaboration tools allowed to enhance new and creative learning environments that strived to motivate and meet the needs of modern learners (Beldarrain, 2006).

Therefore, ICT has transformed distance education by offering new solutions, and facilitating student interactions and real-life collaborations (Beldarrain, 2006). In addition, many advances in features related distance education have deepened such as the study of flipped classrooms, blended learning and e-learning (Kebritchi et al., 2017), computational thinking as content of online education (Kirwan et al., 2018) and inclusive virtual education (Fermín González, 2019).

Table 1 Distance Education Generations

Generation	Description	Technology	Level of interaction	Media
First generation	Correspondence	Print	Low interaction	Print
Second generation	Broadcast radio and television	Radio, tv and telecourses	Low interaction	Audio and video
Third Generation	Open universities	All technologies currently availables	High interaction	All medium available
Fourth generation	Teleconferencing	Audio/Video conferencing Interactive Video	High interaction	Use of audio-video and computer
Fifth generation	Internet/Web	Internet and Web-based education	High interaction	Online-text audio and video

Note. The table illustrates the five generations of distance education, including technologies, interaction levels, and media as proposed by Martin and colleagues (2022). The present table was created by Martin et al (2022), according to the conceptualization of Moore and Kearsley (2011).

2.2. The Wider Problem of Technology Integration

Although distance education has always been widespread in higher institutions, the study of experiences in primary and secondary schools before COVID-19 was significantly scarce (Reyes-Rojas & Sánchez, 2022) with exceptional reviews that addressed specific emerging technologies (Queiroz & Fosso Wamba, 2021). Indeed, distance education has never become the predominant model in lower schools, where the "face-to-face" context has always been preferred (Demiryürek & Atsan, 2015).

The paucity of studies about distance education in secondary schools reflects the broader challenge of ICT integration (Ilomäki & Lakkala, 2018; Reyes-Rojas & Sánchez, 2022).

Indeed, although a plethora of scientific research has shown that successfully integrating technologies into teaching has many benefits, such as promoting students' learning and comprehension and enabling them to participate in a digitalized society (Abdullahi, 2014; Chang et al., 2014; Fraillon et al., 2019; Maharaj-Sharma & Sharma, 2017, Mayer, 2019;), still, technology's impact on education, teaching and learning has been rather limited (Bull et al., 2005; Tondeur et al., 2017). Indeed, the integration of technology in teaching still presents many challenges (Backfisch et al., 2021; Fraillon et al., 2019; Regan et al., 2019) and research has shown that, before the spread of COVID-19, teachers rarely used to use technologies during teaching (Tondeur et al., 2017). Findings of the International Computer and Information Literacy Study (ICILS 2018; Fraillon et al., 2019), for instance, showed that less than the half of the teachers involved had claimed to use digital technology frequently for teaching. In other studies, teachers reported using technology primarily for administrative reasons rather than for educational purposes (Hare 2007; Mwalongo, 2011). As a result, even when teachers integrated technology into their instruction, it was only to complement their traditional methods of teaching or to substitute previous teaching processes, such as for presentations or textbooks (Fraillon et al., 2019; Mwalongo 2011; Thorvaldsen et al. 2012).

In this regard, integrating technology in teaching is considered a slow and complex process affected by many factors (Ertmer et al., 2012; Kim, et al., 2013; Valcke et al., 2007). Some of them are external to the teachers and can be attributed to school administration as, for example, the lack support for the integration of technology across the school; while others include teachers' internal factors such as knowledge and skills concerning how to use specific technologies and devices to teach and control student activities (Xie et al., 2017, Kim et al., 2017) as well as attitudes and beliefs regarding how technology affects teaching, the perceived value of technology as a good means of delivering content and the use of information technology in their own self-efficacy of teaching (Ertmer et al., 2012, Hew and Brush, 2007, Kopcha, 2012; Vongkulluksn et al., 2018).

Concerning the importance of school administration in promoting technology, several initiatives and specialized programs have been implemented to provide schools with technology and to overcome such limits like the lack of computing equipment, technical support and the availability of resources (Hew & Brush, 2007). However, research evidence indicated that the effective integration of technology was still very challenging in teaching and learning (Bulman & Fairlie 2016; Inan & Lowther 2010; Rodríguez et al. 2012). Indeed, while the contextual factors were considered important for successful technology integration, teachers' personal factors appeared to play a more crucial role in making pedagogical transformations regarding the use of technology in their teaching (Li et al., 2018; Tondeur et al. 2008). Indeed, positive attitudes and beliefs were associated with more effective use of technology in reorganizing learning objectives (Miranda and Russell, 2012, Mueller et al., 2008), and in enhancing student engagement and cognitive stimulation by transforming instruction (Ertmer et al., 2012, Hixon and Buckenmeyer, 2009, Hsu, 2016).

2.3. Factors Promoting the Use of Technology

Over the years, many factors concerning individual beliefs and knowledges as well as the presence of facilitating contextual factors have been investigated in promoting the integration of ICT in schools over the years. Despite several variables involved, some of them, such as teacher self-efficacy, facilitating conditions, perceived ease of use and perceived usefulness of technology, teacher digital skills and behavioral intention to use technology, seem particularly relevant (Scherer et al., 2019; Teo, 2009).

Teaching self-efficacy. Albert Bandura (1997) stated self-efficacy as the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). In addition to predicting efforts, perseverance, self-monitoring and motivation, efficacy beliefs help predict how people make their decisions (Bandura 1997). In the educational context, teaching self-efficacy refers to the belief that teachers are capable of performing their professional duties in an effective manner (Morris, 2017). Research found that teachers with great level of teaching self-efficacy were more likely to achieve a higher level of job satisfaction and to have a greater sense of engagement with students (Granziera & Perera 2019). Furthermore, they were more determined when faced educational obstacles and use more creative strategies to assist students in understanding complex subjects also in digital environment (Glackin & Hohenstein, 2018; Van Acker et al., 2013; Zee and Koomen 2016).

Online teaching self-efficacy. Online teaching self-efficacy is specifically related to the belief of being able to use technology to teach properly (Anderson et al., 2011; Banas & York, 2014) and it is considered fundamental in integrating ICT into teaching. Usually, the many differences between a physical classroom environment and an online classroom environment tend to lead teachers to feel less self-efficacious when teaching online. (Johnson et al. 2020). For example, Devica and colleagues (2015) found that teachers reported lower levels of self-efficacy in the online teaching compared to face-to-face teaching. In this regard, a number of issues with online teaching were reported, including time-consuming, the lack of knowledge of online pedagogy, expected technology difficulties, troubles in connecting with students and time-consuming features (Ma et al., 2021).

Facilitating conditions. Facilitating conditions are those factors in the environment that influence a person's perception of how easy or difficult it is to perform a task (Teo., 2009) and they are important indicators for promoting the use of technology both in pre-service and in-service teachers (Teo, 2009, 2011). Limited resources, the perception of not being assited and lack of timely support may prevent individuals from accepting web-based technology (Kamaghe et al., 2020).

Digital Skills. Digital skills refer to the skills required to use communication applications, digital devices, to manage and share information, such as a smartphone app, computer programme, or spreadsheet (Teo, 2009). Indeed, teachers need to be equipped with different digital skills since they need to use digital technologies with well-founded pedagogy to enhance students' learning and facilitate their digital competence (Krumsvik, 2014; Redecker, 2017).

Perceived ease of use of and perceived usefulness of technology. The perceived ease of use of technology is defined as the degree to which the potential user expects the system to be effortless, (Davis et al., 1989) while the perceived usefulness is defined as the prospective user's subjective probability that the use of a specific application system would increase job performance within an organizational context (Davis et al., 1989) and they are both fundamental in determining teachers' use of technology (Hu et al., 2003).

Behavioral intention to Use Technology. Another factor considered relevant in the extant literature is the behavioral intention to use technology, which is defined as "a cognitive process of individuals' readiness to perform specific behavior…[which] … is an immediate antecedent of usage behavior" (Abbasi et al., 2011). Behavioral intention is the key factor determining the success of a system (Abdullah & Ward, 2016; Armenteros et al., 2013; Chang et al., 2017) and it is considered the most important predictor of the actual use of technology (Teo, 2011).

Specifically, the last three variables (Perceived Ease of Use of Technology, Perceived Usefulness and the Behavioral intention to Use Technology) have also been deeply studied as central components of the Technology Acceptance Model (Davis, 1993) the most common model for investigating the acceptance and the integration of technology

(Granić & Marangunić, 2019; Joo et al., 2018; Scherer et al., 2019) and the model that provided the theoretical foundation for the study presented in Chapter 3.

Finally, the use of technology in teaching was found to be related to differences in the grade level and subjects taught (Antonietti & Giorgetti, 2006; Cordes & Miller, 2000; Karaseva et al., 2015; Koc & Gulyagci, 2013). Kindergarten teachers, for example, were found to be less prone to use technology than higher-grade teachers, due to kindergarten children's limited reading and writing abilities (Antonietti & Giorgetti, 2006; Cordes & Miller, 2000; Magen-Nagar & Firstater, 2019). Specifically, differences found in the literature in factors predisposing to technology on the base of teachers' different levels and subjects formed the theoretical basis of the study presented in Chapter 4.

2.4. Factors Promoting the Use of Technology during COVID-19

The widespread occurrence of the new virus "severe acute respiratory syndrome coronavirus 2" (SARS-CoV-2), officially defined by the World Health Organization (WHO) as a pandemic on 11 March 2020, led to the governments of many countries adopting unprecedented actions in order to limit the spread of the virus. At the global level, one of the most dramatic consequences of taking such strong measures was represented by the closure of schools and other educational institutions. Indeed, as reported by UNESCO, nearly 1.6 billion learners in more than 190 countries were affected by COVID-19. The closure of schools and other learning spaces impacted 94% of the world's student population, and up to 99% low and lower-middle-income countries (UNESCO, 2020). In this context, as highlighted by UNESCO guidelines (UNESCO, 2020), distance education was the best strategy recommended to allow students to continue their educational path.

However, providing distance education required great challenges for K-12 teachers who were not used to the approach (Pellegrini & Maltinti, 2020). For example, by

separating the physical and online classrooms, teachers had difficulty communicating effectively with students and were restricted in generalizing their classroom experiences into online teaching (Putra et al., 2020). Indeed, the teacher-student connection can be enhanced by using facial expressions and body language, but these influences were altered in an online context where teachers had to rely on voice communication (Bao 2020).

Therefore, during the COVID-19 pandemic, some studies explored the factors explained in the previous paragraph in relation to distance education, to understand how they impacted its successful implementation.

Indeed, since the pandemic, some studies on teaching self-efficacy have been published by researchers from different countries, revealing a general decrease in teachers' self-efficacy (Cataudella et al., 2021; Pellerone, 2021; Pressley & Ha, 2021; Takunyaci, 2021). However, findings have been mixed as other studies found an increase in teacher self-efficacy. Regardin online teaching self-efficacy, Ma and colleagues (2021) found an increase in in Chinese teachers during the COVID-19 pandemic, while Košir and colleagues (2020) showed that Serbian teachers with high online teaching self-efficacy had positive attitudes towards distance education and perceived a high level of supervisor support, and experienced less stress in using technologies.

Sangeeta and Tandon (2020) analyzed facilitating conditions in a sample of 643 Indian school teachers during the COVID-19 pandemic, and found a significant positive impact on behavioural intentions to use technology.

In relation to digital skills, teachers did not seem to be suitably trained to acquire digital competencies in digital environments. Indeed, studies during COVID-19 highlighted the urgent need to improve technology skills and competencies among teachers (Portillo et al., 2020; Trubavina et al., 2021).

Regarding the perceived ease of use of technology, Rahayu and Wirza (2020) analyzed it in 102 Indonesian teachers, and identified a positive perception between the usefulness and ease of use of distance education. Alhumaid and colleagues (2020)

analyzed Pakistani university instructors' perceptions and showed that perceived usefulness affected the positive relationship between technology acceptance and distance education.

2.5. The Italian Context

Despite an increase in the availability of technology in schools (Fornasari, 2019), Italian teachers did not feel they were ready or experienced enough to integrate technology into their lessons prior to COVID-19 (Fornasari, 2019; Pellegrini & Maltinti, 2020) Indeed, data published by the European Commission in 2019 and WeSchool showed that only 20% of teachers had attended digital literacy training courses, 40% would have liked to learn to do it, and the remaining 40% were against it (Pasta, 2020). These results accord with what emerged from the OCSE TALIS 2013 survey, where Italian teachers were ranked in first place among all the European countries for technology training needs: at least 36% of teachers stated that they were not sufficiently prepared for digital teaching, compared to a European average of 17%. Moreover, according to the TALIS 2018 report (OECD, 2020b), Italy was below the OECD average for technology use during class lessons – just 47% of teachers reported that they allowed students to use technology frequently during lessons.

However, during the spread of COVID-19, Italy was the first European country to adopt such dramatic containment measures in order to contrast the rapidly evolving situation. On 9 March 2020, a Decree of the Italian Prime Minister (named "I stay at home") ordered a nationwide lockdown that affected the population's daily life at all levels in unprecedented ways. In the decree, many forms of social aggregation were forbidden, and this implied the closure of public and private educational buildings. As a consequence, about 12 million learners from pre-primary to tertiary education were not allowed to attend school. Therefore, the Ministry of Education, in line with UNESCO (2020) emphasized the potential of distance education for not only to continuing the

educational path but also limiting the feelings of isolation and demotivation in students (*Ministero dell'Educazione, dell'Università e della Ricerca*, 2020). Thus, as rapidly as possible, school principals and teachers implemented distance education using different systems to deal with the emergency lockdown (Pellegrini & Maltinti, 2020).

However, adapting lessons to an online environment required teachers to use virtual communication programs and synchronous and asynchronous teaching modes, which presented many challenges. Indeed, although the Ministry of Education offered suggestions and a wide choice of online training courses for teachers (Pellegrini & Maltinti, 2020), no specific information on the management of distance education was provided. Besides, most teachers were facing the use of computer-based or web-based educational instruments for the first time, while lacking appropriate equipment and experiencing a paucity of readily available local or cloud Webservices (Giovannella et al., 2020; Pellegrini & Maltinti, 2020).

In such a context, and considering the importance of the integration of ICT both in presence and in online environments, it is, therefore, necessary to understand the nature of the factors that can predispose the positive use of technologies in teaching. Furthermore, in light of the extraordinary nature of the COVID-19 pandemic, it would be worthwhile to examine the experiences, positive and negative, of teachers implementing distance education.

CHAPTER 3
PROMOTING THE INTEGRATION OF TECHNOLOGY IN TEACHING: AN ANALYSIS OF THE FACTORS THAT INCREASE THE INTENTION TO USE TECHNOLOGIES AMONG ITALIAN TEACHERS

The following chapter is a modified version of the article:

Menabò, L., Sansavini, A., Brighi, A., Skrzypiec, G., Guarini, A. (2021). Promoting the Integration of Technology in Teaching: An Analysis of the Factors that Increase the Intention to Use Technologies among Italian Teachers. *Journal of Computer Assisted Learning*, 37(5), 1-12. https://doi.org/10.1111/jcal.12554.

3.1. Introduction

The widespread occurrence of the new virus "severe acute respiratory syndrome coronavirus 2" (SARS-CoV-2), officially defined by the World Health Organization (WHO) as a pandemic on 11 March 2020, led to the governments of many countries adopting unprecedented actions in order to limit the diffusion of the virus. At the global level, one of the most dramatic consequences of such strong measures was the closure of schools and other educational institutions.

Italy was the first European country to adopt dramatic containment measures such as closure of public and private educational buildings. Consequently, about 12 million pre-primary to tertiary education learners were not allowed to attend school, forcing classes to an online environment. While people's safety was the priority in the pandemic, it is undeniable that the closure of schools affected students, particularly adolescents (Liang et al., 2020) due to their importance in promoting and supporting student well-being (Skinner et al., 2009).

In the current historical period distance teaching may represent an important resource for continuing the educational path (UNESCO, 2020). Indeed, as reported by the World Health Organization (2001) "among all the sectors that play critical roles in adolescent

health, education is key" (p. 8). Thus, understanding factors promoting the implementation of distance education and how they can interact appered to be fundamental.

3.1.1. The Technology Acceptance Model

The Technology Acceptance Model (TAM, Davis, 1993) represents the most used model for understanding the acceptance and integration of technology (Granić & Marangunić, 2019; Joo et al., 2018; Scherer et al., 2019). The original TAM version (Davis, 1993) suggested that the intention to use technology could be explained by three different factors: *perceived ease of use of technology, perceived usefulness of technology* and *attitude towards using technology*. In particular, perceived usefulness and perceived ease of use are of primary relevance for technology acceptance behaviors (Wahid, 2007). Despite several similarities, perceived usefulness and perceived ease of use have been shown to be statistically distinct dimensions (Hauser & Shugan, 1980) and the influence of perceived usefulness on the behavioral intention to use technology was found to be 50% stronger than that of perceived ease of use (Davis, 1993).

Over the years, the TAM model, with particular attention to perceived usefulness and perceived ease of use, has been tested to predict the behavioral intention to use technology in many different fields such as e-banking, e-commerce, and social networking media (Deng et al., 2005). The TAM model has been applied and validated in predicting the use of technology also in education settings among teachers (Teo, 2011). Moreover, a longitudinal study by Hu and colleagues (2003) found that different factors influenced the process of teachers accepting technology but that perceived usefulness and perceived ease of use were fundamental determinants for their continued acceptance of technology.

New factors with significant influence on the core variables of the TAM model are being continuously revealed and they are considered fundamental since many authors have recognized that perceived ease of use and perceived usefulness do not sufficiently

explain the use of technology, highlighting the need to introduce and consider other factors (Venkatesh et al., 2003, Venkatesh et al., 2012).

3.1.2. The Importance of Online Teaching Self-efficacy

In educational research, teachers' self-efficacy is about their beliefs and confidence to carry out good teaching in the classroom (Christophersen et al., 2016), affecting the quality of their instructional practices and student engagement (Chacón, 2005; Graham et al., 2001). Self-efficacy in using technology, for example, is another key factor in promoting its use (Compeau & Higgins, 1995). The general construct of self-efficacy refers to individuals' beliefs about their capabilities to successfully carry out a specific course of action (Bandura, 1997). The concept of self-efficacy has been found to be particularly important for the use of technology among teachers (Fanni et al., 2013; Krumsvik, 2011; Tondeur et al., 2009).

However, when self-efficacy was referred to online educational settings, two distinct meanings of self-efficacy were considered (Gudmundsdottir & Hatlevik, 2018; Krumsvik, 2011). The first one represents the general concept of "digital self-efficacy" and the evaluation of one's capability to use technology as a tool (Compeau & Higgins, 1995). Firstly, digital self-efficacy is independent from being a teacher and using technology for teaching. The second one, called "online teaching self-efficacy", ismore specifically related to the use of technology for teaching or didactical purposes (Gudmundsdottir & Hatlevik, 2018). Both types of self-efficacy have played an essential part in predisposing individuals to use technology in teaching (Hatlevik, 2017; Tilton & Hartnett, 2016). Indeed, several authors found that preservice teachers with lower digital self-efficacy in basic technology were less likely to become users of technology for didactic teaching (Hammond et al., 2011; Teo, 2014). At the same time, online teaching self-efficacy significantly predicted the use of technology among teachers (Hatlevik, 2017) and preservice teachers (Teo, 2009).

3.2 The Present Study

In the model proposed for this study, it was hypothesized that the direct relationship between perceived usefulness and behavioral intention would be moderated by online teaching self-efficacy, and in turn, moderated by perceived ease of use of technology. Indeed, even if TAM comprised other variables in the model (such as attitudes), perceived usefulness and perceived ease of use were considered the main variables to directly or indirectly explain the intention to use technology (Marangunić & Granić, 2015). It follows that direct effects of perceived usefulness, perceived ease of use, and online teaching self-efficacy were hypothesized on the behavioural intention to use technology. Interaction effects between these three variables were also hypothesized. Therefore, a theoretical model in which perceived usefulness was the focal predictor, with online teaching self-efficacy the first moderator and perceived ease of use as the second moderator on the behavioral intention to use technology, was tested (Figure 1).

Although more studies are required on both types of self-efficacy, according to Gudmundsdottir and Hatlevik (2018), the present study focused on online teaching self-efficacy, since this topic is unique to teachers' education while digital self-efficacy can be applied to different fields (Gudmundsdottir & Hatlevik, 2018). In addition, even if digital self-efficacy was a possible predictor of perceived usefulness (Scherer et al., 2019), only a few studies have examined the importance of online teaching self-efficacy (e.g., Horvitz et al., 2015), showing the need to further analyze its role in the use of technology. From this starting point, the degree of online teaching self-efficacy was not a predictor of perceived usefulness but rather a moderator, since it could influence the relationship between perceived usefulness and perceived ease of use. Furthermore, in terms of perceived ease of use, it could moderate the conditional influence of online teaching self-efficacy in the relationship between perceived usefulness and the intention to use technology: the easier a system is to use, the greater will be the user's perceived self-efficacy regarding their capacity to use the system comfortably (Saadé & Kira, 2007).

Finally, the number of hours spent in distance teaching for the week was included in the

model as a control variable.

Figure 1 Research TAM Model with Online Teaching Self-efficacy and Perceived Ease of Use as Moderators of Behavioral Intentions to Use Technology

Online Teaching Self-efficacy

Hours in Distance Teaching

Perceived Ease of Use

Perceived Usefulness

Behavioral Intention to Use Technology
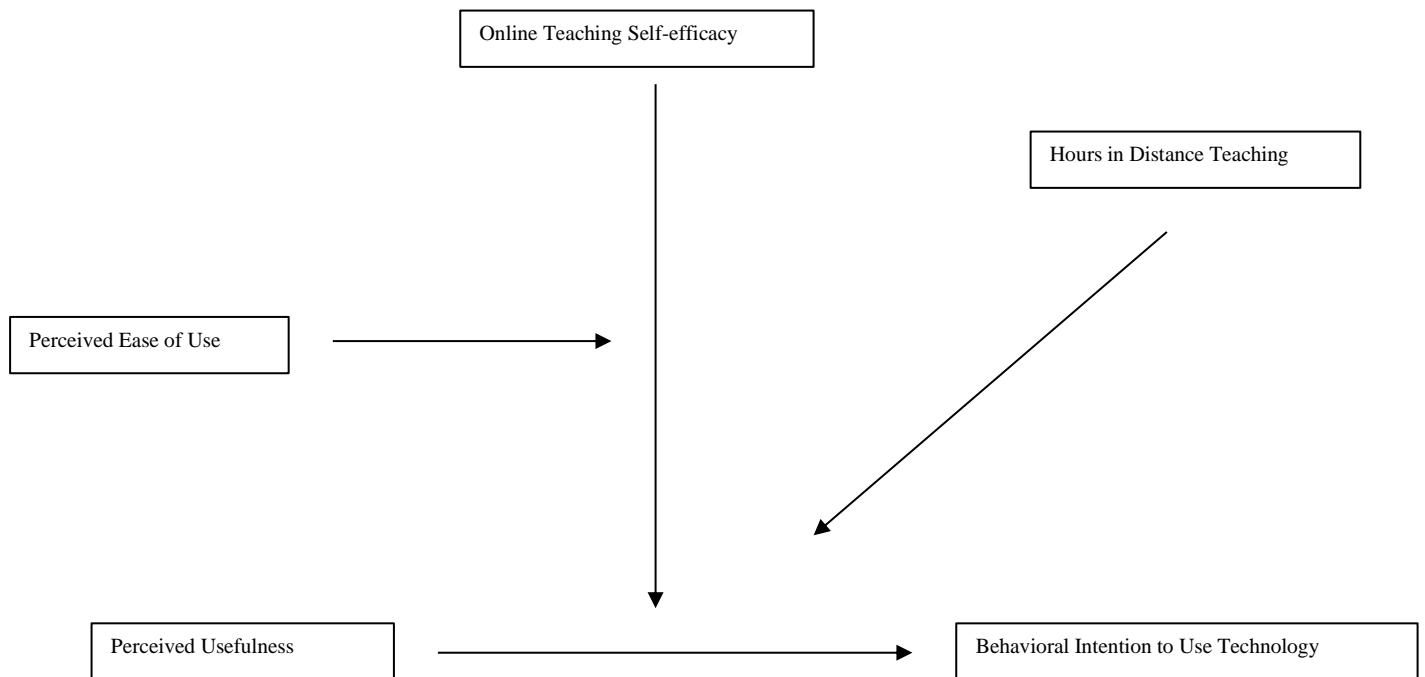
3.3. Method

3.3.1 Participants and Data Collection

In the present study, 178 Italian upper secondary school teachers filled out an online questionnaire available on QUALTRICS in a two-month period from 15 May to 10 July 2020, during the school closure period for the lockdown. Participation was voluntary and respondents were recruited through an invitation by e-mail and through advertising on social platforms.

The sample comprised 70% (n = 120) females and 30% (n = 51) males. The majority of the sample was from northern-Italy regions (n = 124, 73%). A smaller proportion (n = 33, 19%) was from central-Italy regions and a few (n = 14, 8%) from southern-Italy regions. Concerning age, 6.5% (n = 11) of teachers were aged between 21-30 years, 9% (n = 15) between 31-40 years, 30% (n = 51) between 41-50 years, 38 % (n = 65) between 51 and 60 years and finally 16.5% (n = 28) more that 61 years old (8 responses were missing).

Concerning the subjects taught, literacy (n = 37, 15%) and foreign language (n = 33, 14%) were the most represented, followed by maths (n= 26, 11%) and history (n= 25, 10.5%). In addition, 129 (72%) teachers reported teaching only one subject, 39 (22%) two subjects, 7 (4%) three subjects and 3 (2%) more than 3 subjects. About the number of classes, the majority of participants taught in more than five classes (n=47, 26.5%), 29 (16.5%) participants reported teaching in 5 classes, 40 (22.5%) teachers in 4 classes, 44 (25%) teachers in 3 classes, 12 (7%) in 2 classes and finally just 4 (2.5%) in 1 class (two participants did not answer the question).

3.3.2 Measures

An online questionnaire was developed to investigate the perceived usefulness in using technologies in teaching, self-efficacy as teacher in digital environment, the

perceived ease of use technology, the behavioural intention to use them and the average number of hours spent in distance teaching. A section regarding demographic information was also included ("What do you teach in this school year?" (multiple responses); "In how many classes do you teach?"; "Which Italian region are you from?"; "Please, select your age group"). Participants took about 10-15 minutes to complete the questionnaire.

Perceived Usefulness

Perceived usefulness was evaluated using a 4-item scale based on the study by Teo (2011) ("Using technology enables me to accomplish tasks more quickly"; "Using technology improves my performance"; "Using technology increases my productivity"; "Using technology enhances my effectiveness"). The scale was assessed on a 7-point Likert scale (1= strongly disagree and 7=strongly agree). Cronbach's alpha was 0.90.

Online teaching Self-efficacy

Online teaching self-efficacy was evaluated using an adaptation of the Teacher Sense of Efficacy Scale (TSES, Tschannen-Moran & Hoy, 2001). The questionnaire was originally designed to investigate self-efficacy of teachers in the classroom but it was modified by (Robinia & Anderson, 2010) to investigate online teaching efficacy. However, this new questionnaire targeted nurse educators employed in higher education institutions. Thus, the questionnaire was further adapted to address upper secondary school teachers. The final questionnaire consisted of 8 questions ("How much can you assist families online in helping their children do well in school?"; "How much can you do to motivate students who show low interest in online schoolwork?"; "How much can you do to get students to believe they can do well in online schoolwork?"; "How much can you do to help your students value learning in online activities?"; "To what extent can you use a variety of online assessment strategies?"; "To what extent can you provide online an alternative explanation or example when students are confused?"; "To what extent can you craft good online questions for your students?"; "How well can you implement

alternative strategies in your online classroom?"). The scale was assessed on a 9-point Likert scale (1= not at all and 9 =a great deal). Cronbach's alpha was 0.93.

Perceived Ease of Use

Perceived ease of use was assessed using a 5-item scale derived from Teo's (2011) study ("Learning to use technology is easy for me"; "I find it easy to use technology to do what I want to do"; "My interaction with technology does not require much effort"; "It is easy for me to become skilful at using technology"; "I find technology easy to use", Teo, 2011). The scale was assessed on a 7-point Likert scale (1= strongly disagree and 7=strongly agree). Cronbach's alpha was 0.94.

Behavioural Intention to Use

The behavioural intention to use technology was assessed using a 3-item scale ("I intend to continue to use technology in the future"; "I expect I would use technology in the future"; "I plan to use technology in the future"; Teo, 2011). The scale was assessed on a 7 point Likert scale (1= strongly disagree and 7= strongly agree). Cronbach alpha was 0.94.

Hours in Distance Teaching

Respondents were asked to indicate the average number of hours spent in distance teaching per week ("How many hours per week do you use distance teaching?") during the lockdown, when the school buildings were closed but teaching was moved online. Teachers inserted the number of hours.

3.3.3. Ethics

Formal approval for the study was provided by the Bioethics Committee of the University of Bologna. In the information statement, participants were informed about the purpose of the research and the procedures; the benefits/risks of participating in this study; the rights to decline to participate and to withdraw from the research without consequences according to the Declaration of Helsinki. Participants did not receive incentives or benefits for their participation.

3.3.4. Data Analysis

In order to address the research questions and hypotheses related to the direct effects as well as moderation effects, a conceptual model with two moderators was developed (see Figure 1). In the model, online teaching self-efficacy in using technologies was the first moderator, while the perceived ease of use represented the second moderator (Figure 1). The analysis relied on the use of the PROCESS macro (Model 3, Hayes, 2013). PROCESS is a computational tool available for SPSS, which estimates all path coefficients, standard errors, t- and p-values, confidence intervals, and other statistics in moderation, mediation and conditional process analysis with observed variables in a model PROCESS uses ordinary least squares regression to estimate the parameters of each of the equations. In addition, it estimates each equation separately, meaning that the estimation of the regression parameters in one of the equations does not affect the estimation of the parameters in any other equations defining a model (Andrew Hayes, 2013). In the present research, bootstrap resampling (5,000 samples) was used to estimate 95% confidence intervals. All analyses included a correction for heteroscedasticity (HC3) (Davidson & MacKinnon, 1993), as recommended by Hayes & Cai (2007). Interaction variables were centered on having a mean of 0 before the analyses, and the Johnson-Neyman technique was used to compute the range of significance and simple slopes for the interaction analyses (Johnson & Neyman, 1936). Unstandardized regression coefficients are reported (Hayes, 2017). All analyses were two-tailed and used conventional significance thresholds (α = .05).

3.4 Results

The model shown in Figure 1 was significant, $F_{(8,169)}$= 19.48, p= < .001, R^2= 0.48, and explained 48% of the variability in the data. Hours spent in distance teaching used

as a control variable did not show a significant effect on the intended use of technology (b= 0.017, p = .67).

3.4.1. Direct Effects

As shown in Table 2, the perceived usefulness of technology was positively related to the behavioral intention to use technology in teaching (r= 0.60, p < .001,). The existence of this direct effect was supported by the ordinary least squares regression [β= 0.45, t(8,169)= 6.10, p < .001; see Table 3]. Also online teaching self-efficacy was positively correlated with the behavioral intention to use technology (r= 0.42, p < .001, Table 2). The ordinary least squares regression showed that self-efficacy had a significant direct effect on intentions to use technology in teaching [β = 0.11, t (8,168) = 3.82, p <.001; see Table 3]. Perceived ease of use of technology was positively correlated with the behavioural intention to use technology too (r= 0.37, p < 0.01, Table 2), and the existence of this relationship was supported by the ordinary least squares regression [β = 0.11, t (8, 168)= 2.54, p= .012; see Table 3], revealing its direct effect.

Table 2 Descriptive Analyses and Correlations for Study Variables

Variable	M	SD	1	2	3	4	5
1. Perceived usefulness	12.79	4.98	-				
2. Self-efficacy	42.79	11..33	0.39**	-			
3. Perceived ease of use	24.32	7.11	0.42**	0.37**	-		
4. Behavioral intention to use	15.72	4.54	0.60**	0.42**	0.37**	-	
5. Hours in distance teaching	13.76	8.14	-0.16	0.15	0.02	-0.12	-

3.4.2. Indirect Effects

The interpretation of the two-way analyses suggested that the relationship between perceived usefulness of technologies and the intention to use them was not moderated by online teaching self-efficacy [b= -0.011, t(8,168)= -1.81, p= .07; see Table 3] nor by the perceived ease of use [β= 0.005, t(8,168)= 0.42, p= .67; see Table 3]. In addition, the relationship between online teaching self-efficacy and the behavioral intention to use technologies was not moderated by perceived ease to use [β= 0.007, t(8,168)= 1.23; p= .21; see Table 3].

A significant three-way analysis was found [β= -0.002, t(8,168)= -2.88, p < .01; see Table 3], revealing that the perceived ease of use of technologies moderated the conditional influence of online teaching self-efficacy in the relationship between perceived usefulness and the intention to use technologies.

Table 3 Direct and Interaction Effects Between Variables

Effect	b	SE	95% CI	
			LL	UL
Perceived usefulness	.452	.074	.306	.599***
Self-efficacy	.111	.029	.054	.168***
Perceived ease of use	.117	.046	.024	.209*
Perceived usefulness * Self-efficacy	-.011	.006	-.023	.001
Perceived usefulness * Perceived ease of use	.005	.010	-.016	.026
Self-efficacy * Perceived ease of use	.007	.005	-.004	.017
Perceived usefulness * Self-efficacy * Perceived ease of use	-.002	.001	-.004	-.007**

Note. Analyses performed using the PROCESS macro for SPSS (Model 3; Hayes 2013). *p < 0.05, **p < 0.01, ***p < 0.001

Abbreviations. CI, confidence interval; LL, lower limit; UL, upper limit.

As shown in Figure 2 the highest scores of the intention to use technology occurred with higher scores in perceived usefulness, online teaching self-efficacy and perceived ease of use (M= 19.33).

Analysis of the simple slopes revealed that the three-way interaction was significant for medium (β= -0.016, p= .01) and high levels (β= -0.027, $p < .001$) of perceived ease of use. In these cases the intention to use technology was strongly influenced by the perceived usefulness of technology, with a greater increase from low to high scores ($\beta = 0.79$, $SE = .112$, $p < .001$, see Figure 2) for low levels of self-efficacy. By contrast, when self-efficacy was high, the intention to use technology was not affected by different levels of the perceived usefulness of technology ($\beta = 0.16$, $SE = 0.125$ $p = .195$).

When the perceived ease of use was low, there was no significant interaction between the perceived usefulness and online teaching self-efficacy (b= -0.006, p= .60), revealing that the relationship between perceived usefulness and intention to use technology was not affected by different levels of online teaching self-efficacy (low self-efficacy: $\beta = 0.35$, SE= 0.154, p =0.023; high self-efficacy: β= 0.48, SE= 0.193, $p < .001$).

Figure 2 Three-way interaction of perceived usefulness, online teaching self-efficacy and perceived ease of use
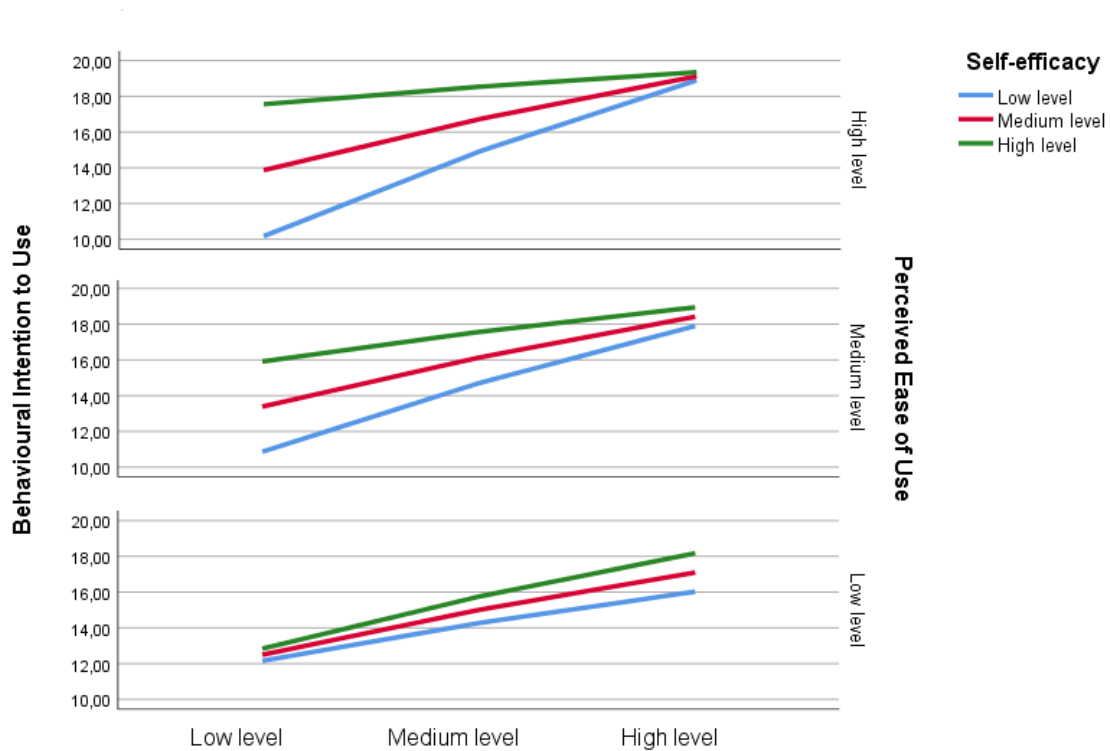
Note. Three-way interaction plot of perceived usefulness, online teaching self-efficacy, and perceived ease of use on behavioural intention to use technology.

3.5 Discussion

The spread of COVID-19 highlighted the importance of teachers being ready to implement distance education or a blended modality of teaching, in lock-down conditions.

The present research examined the impact of the key elements of the TAM model (Davis et al., 1989), namely perceived usefulness of technology and perceived ease of use of technology, and online teaching self-efficacy (Horvitz et al., 2015) on behavioral intentions to use technology.

Both perceived usefulness and perceived ease of use of technology were significant predictors of teachers' intentions to use technology. Although these results confirmed other studies (Marangunić & Granić, 2015; Pynoo et al., 2012; Smarkola, 2007), previous research has paid little attention to teachers in upper school levels (De Smet et al., 2012; Kumar, 2008). Indeed TAM has been mainly used to investigate the acceptance of technology among higher education teachers or students (Joo et al., 2018; Park et al., 2012; Persico et al., 2014) and among preservice teachers (Acarli & Saglam, 2015; Teo, 2008). To my knowledge, perceived usefulness and perceived ease of use have never been tested in an Italian secondary teacher sample but just on students or university teachers. Persico and colleagues (2014), for example, adapted the TAM model for teachers of an online university to evaluate an e-leaning system in Italy. Cacciamani and colleagues (2018) asked for students' opinion on those factors fostering the use of tablet personal computers in secondary schools.

In terms of online teaching self-efficacy, a significant direct effect on behavioral intentions to use technology was found in agreement with other studies (Joo et al., 2018; Liaw, 2002; Moreira-Fontán et al., 2019). However, little attention has previously been paid to online teaching self-efficacy among Italian teachers. For instance, Benigno and colleagues (2014) validated the Intrapersonal Technology Integration Scale (ITIS, Niederhauser & Perkmen, 2008) to study the role played by teachers' beliefs in the process of the integration of technology in the classroom, finding that self-efficacy predicted teachers' intentions to integrate ICT in their practice.

The most innovative result of the present study was the interaction between the three variables since this represents the first research in which online teaching self-efficacy was examined in relation to perceived usefulness and perceived ease of use of technology among upper Italian secondary school teachers. Overall, these results may be particularly interesting in in terms of shedding further light on the validity of the TAM model (Davis et al., 1986; Scherer et al., 2019) and on the importance of online teaching self-efficacy (Hatlevik, 2017), showing a new way in which the variables could interact. Indeed, the findings clearly indicate that when perceived ease of use of technology was

middle to high, the intention to use technology was strongly influenced by the perceived usefulness for low levels of online teaching self-efficacy. On the contrary, high levels of online teaching self-efficacy were an important component per se, revealing that it represented a key factor in disposing teachers to use technology regardless of different levels of perceived usefulness of technology.

The direct effects as well as the triple interaction effect, represent an argument for developing frameworks and approaches to foster the adoption of distance education or blended modality during COVID-19 and beyond. First of all, considering perceived ease of use of technology, there is the need to provide teachers with easy and straightforward technologies through which implementing distance teaching or, in the future, integrating the technology in their classes can be facilitated. The second implication concerns the role of online teaching self-efficacy in using technologies for education. It is important to promote teachers' sense of online teaching self-efficacy through training or interventions focused on enhancing their self-efficacy in this sphere. Strengthening the sense of digital self-efficacy and, at the same time, providing teachers with easy-to-use tools could already represent a first step towards the successful integration of technology in teaching. However, it is essential to remember that the highest level of intention to use technology was present when all three variables were at high levels. Consequently, the best scenario would be to provide training opportunities for teachers that foster online teaching self-efficacy and point out the actual usefulness of the technologies, and so encourage schools to adopt easy technological tools.

3.5.1 Limitations

The first limitation concerns the sample size. The limited sample size was also reflected in the low triple interactions' beta value, which, although in line with other studies (Gil de Zúñiga et al., 2018; Wieder & Terhune, 2019) could increase with a larger sample. Thus, further analyses could replicate the current study considering a larger sample. The second limitation concerns other important variables, such as attitude

towards technologies (Davis, 1986) and subjective norms, as postulated by the theory of planned behaviour (Ajzen, 1991), which was not considered in the present study. The integration of other variables could be particularly relevant to better understand factors fostering the use of distance teaching. The third limitation concerns the demographic composition of the sample, since the number of females was highly greater than males, although this gender composition aligns with the actual Italian context where 78% of teachers are women (OCSE TALIS, 2018). Further research should analyze the role of gender since contrasting results have been reported by Yuen and Ma (2002). They found that perceived usefulness and perceived ease of use of technology influenced the intention to use computers more for females than males. On the contrary, Ong and Lai (2006) found that mens' ratings of perceived usefulness, computer self-efficacy, perceived ease of use, and behavioral intention to use e-learning were higher than those of women. The last limitation was that most of my sample was from northern Italy and a smaller number were from central and southern Italy. Italy has a centralized school system, but social inequalities between the north and south that could impact the findings have been highlighted by (Ballarino et al., 2014). Thus, a balanced data collection between Northern and Southern Italy would be helpful in improving the generalizability of the findings.

3.6. Conclusions

Existing literature demonstrated that perceived ease of use of technology, perceived usefulness of technology and online teaching self-efficacy play a crucial role in the acceptance of technology by teachers. However, little was known about their reciprocal relationship and whether they could have a positive predictive effect on the intention of using technology, especially in the context of upper secondary school education in Italy. The present study found a moderation effect when technology was perceived easy to use (medium or high level). The effect of perceived usefulness of technology on the

behavioural intention to use technology was particularly strong for low levels of online teaching self-efficacy. On the contrary, no significant effect of the perceived usefulness of technology on the behavioural intention to use technology was present for high levels of online teaching self-efficacy since, in this case, this latter variable represented a key factor in promoting the use of distance teaching per se. This research provides important targeted implications for the policy and practice of distance education to promote its adoption in primary and secondary schools and not just in university institutions.

CHAPTER 4
DISTANCE EDUCATION AMONG ITALIAN TEACHERS: DIFFERENCES AND EXPERIENCES

The following chapter is a modified version of the article:

4.1. Introduction

The importance of successfully integrating technology in teaching is not a new topic for policymakers and educational researchers (Voogt et al., 2013). The OECD (2015) and European Commission (2016) for example, stated that member states should foster the development of new digitalized learning environments to ensure national education systems stay up to date (Salmieri, 2019). In addition, several studies reported that the integration of technology in instruction is an essential ingredient for student success in the 21st-century (Foster et al., 2011; Harter, 2011; Washbon, 2012). However, the past two years have revealed the difficulty of integrating technology in the education system worldwide. Indeed, the spread of COVID-19 forced several countries, like Italy, to shift educational activities to digital environments, requiring teaching staff to move quickly to distance education, fuelling uncertainties and disagreement about how to implement it (Pellegrini & Maltinti, 2020). Thus, online learning has become the main challenge not only for universities, where distance education was already familiar, but also for primary and secondary schools. In this context, it becomes crucial to understand how factors promoting technology (teaching self-efficacy, online teaching self-efficacy, facilitating conditions, perceived ease of use of technology, teacher digital skills and behavioural intention to use technology) support distance education such as that needed during the COVID-19 pandemic and to describe the associated experiences, feelings, and perceived challenges. Moreover, even if previous literature has highlighted differences

in integrating technology based on different school policies, literature on this topic during COVID-19 seems scarce, requiring further investigation.

4.1.1. Challenges and Experiences in Distance Education

Challenges and experiences related to the use of distance education were widely explored before the COVID-19. However, the literature seems scarce concerning studies involving lower schools, while many studies have focused on high-level education (for a literature review, see Carrillo & Flores, 2021; Kebritchi et al., 2017). Due to the increased use of distance education during the COVID-19 pandemic, some studies have examined distance education in primary and secondary schools using a qualitative approach.

Atmojo and Nugroho (2020) interviewed 16 Indonesian upper secondary teachers to reveal the critical financial condition of many students' families that impeded distance education. They found that many students lacked smartphones, Internet quota, and stable Internet connections. Similar issues were reported by three upper secondary school teachers in Zambia (Sintema, 2020), where they expressed concern for their students' academic performance because of the lack of technological devices. Difficulties with Internet access and lack of infrastructure, classroom management and human resources also emerged as concerns among 65 Turkish teachers in a study by Sari and Nayir (2020).

A significant challenge for teachers during the COVID-19 pandemic concerned their skills in using technology for education. Teachers reported not being ready for the distance education process, claiming the need for support and distance education training (Sari & Nayir, 2020). In particular, 50 Turkish teachers reported negative views of their online competency due to their non-creative traits and inability to use interactive resources (Koçoglu & Tekdal, 2020). Similar considerations emerged among 6 North American primary school educators, who described struggling to learn to use technology and to provide meaningful but socially distant learning experiences (Anderson & Hira, 2020). In a similar vein, Indonesian upper secondary teachers described a general lack

of preparation and planning for distance education (Atmojo & Nugroho, 2020). A further consideration reported by teachers concerned the difficulty of evaluating and monitoring students and designing online courses based on available resources (Hebebci et al., 2020; Niemi & Kousa, 2020; Sari & Nayır, 2020).

Beyond the concerns associated with distance education, teachers also reported benefits and positive aspects, such as the possibility of interacting with students even if in a period of emergency, and the possibility of creating meaningful and entertaining lessons thanks to the use of technology and staying at home (Danchikov et al., 2021; Hebebci et al., 2020; Niemi & Kousa, 2020).

While the qualitative studies described above provided an in-depth analysis of teachers' challenges and experiences in distance education during the COVID-19 pandemic, they involved a low number of participants, and posed limitations in the generalization of results. To my knowledge, no studies have investigated positive and negative experiences associated with distance education among a large Italian sample of teachers, using interviews or questionnaires with open-ended questions. Moreover, Italian teachers had to face a long period of distance education during the lockdown which lasted from March 2020 to May 2021, with some periods of interruption.

4.1.2. Differences Among Teacher School Grade Level and Subject Area

Furthermore, previous studies have not analyzed differences and similarities among school teaching grades and subject areas in distance education, although important differences have been described among school grade levels and subjects in the intention to use or in the use of technology. Kindergarten teachers, for example, were found to be less prone to use technology than higher grade teachers, due to kindergarten children's limited reading and writing abilities (Antonietti & Giorgetti, 2006; Cordes & Miller, 2000; Magen-Nagar & Firstater, 2019). By contrast, pre-service teachers, who are often part of the Net-generation and actively use technology in everyday living (Tapscott, 2008), have shown very positive attitudes towards the use of technology (Koc & Gulyagci, 2013;

McGarr & Gavaldon, 2018; Şad & Göktaş, 2014). These differences were related to different pedagogical beliefs in using technology, defined as the teacher's own understanding about teaching and learning (Pajares, 1992), and which were found to be strong predictors of the educational use of technology (Ertmer et al., 2015; Tondeur et al., 2021). Specifically, teachers seem to select technological applications that align with their existing beliefs about "good education" (Tondeur, 2021).

Research has shown that technology use can also differ among teachers of different subjects, especially science and humanities teachers, since their different pedagogical beliefs relate to technology use (Karaseva et al., 2015). One reason may be the different perspectives in which teachers are introduced to the technology in their training and academic paths (Karaseva et al., 2015) since much emphasis is on the importance of technology for science teachers (Hammond et al., 2011). Another aspect is the perceived subject nature and how the new technology fits existing subject practices and content (Selwyn, 1999). For example, Goodson and Mangan (1995) showed differences in teacher-initiated activities using technology among art, geography, and history teachers. Indeed, art teachers were more likely to see technology as an impediment to teaching rather than a helpful tool. Moreover, John and Baggott la Velle (2004) argued that science and mathematics teachers held relatively open attitudes toward the potential of technology to transform teaching, which is consistent with the role of mathematics in the evolution of digital technologies. Literature teachers, on the contrary, were found to be more anxious about "losing the core features and values" of their subject, classroom discussion, and use of printed text (Hennessy et al., 2005). However, other studies have shown contrasting results, revealing that mathematics teachers were less likely to integrate technology in classrooms than literature teachers because mathematics requires repetitive practices to master knowledge, and technology was not considered useful and important for learning mathematics (Howard & Maton, 2011).

Although these differences could affect how teachers approach themselves to distance education, to the best of my knowledge, only a few published works have evaluated the differences among grade levels and subjects during the COVID-19

pandemic, and these have shown contrasting results. Giovannella and colleagues (2021) investigated a large sample of Italian teachers and found that upper secondary school teachers had higher readiness to switch to online education compared to their colleagues in other school levels. By contrast, Alea and colleagues (2021), who examined Philippine teachers from different grade levels, did not find any differences among the subjects taught and the teachers' level of education.

Although it is undeniable that these studies have provided meaningful insights about the implementation of distance education in the emergency period of COVID-19 school closures around the world, some gaps in knowledge still need to be filled.

The first gap involves the analysis of several factors promoting technology together and how they could vary in their influence according to the teachers' grade level and subject area. Indeed, as described above, only two studies have been carried out on the differences among school grade levels and subject areas in the readiness to use technology, and these have revealed contrasting results (Alea et al., 2021; Giovannella et al., 2020).

The second gap concerns the qualitative studies conducted about distance teaching during the COVID-19 pandemic that while showing promising results, involved only small groups of participants, and did not explore teachers' experiences of different school grade levels and subject areas.

Despite their benefit, the third issue is the lack of studies combining qualitative and quantiative methods (Östlund et al., 2011). Indeed, Hurmerinta-Peltomäki and Nummela (2006) found that using qualitative and quantitative methods increases validity in the findings, gaining a deeper and broader understanding of the phenomenon than studies that did not utilize both the approaches. Although some studies including qualitative and quantitative designs have been published, many of them have focused on tertiary education (Crowe et al., 2021; Popa et al., 2020), while few studies were conducted in primary and secondary schools (Cardullo et al., 2021; Hussein et al., 2021) To my knowledge, no studies have used both qualitative and quantitative methods to investigate Italian teachers' experiences of distance education during the COVID-19 lockdown. Such

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a study is particularly pertinent among Italian teachers, as they endured a long period of distance education during the COVID-19 lockdown.

4.2. The Present Study

The present research investigated distance education in a 2-month period during the COVID-19 pandemic, as described by Italian teachers. The quantitative approach was used to compare different grade teachers and subjects regarding several variables promoting distance teaching, including teacher self-efficacy, online teaching self-efficacy, facilitating conditions, perceived ease of use, basic technology skills, advanced technology skills, technology for pedagogy and behavioral intention to use technology. The main aim of the qualitative study was to explore positive and negative aspects of distance teaching according to teachers in different grade levels and teaching different academic subjects.

4.3. Method

4.3.1. Participants and Data Collection

In the present study, 357 teachers and pre-service teachers completed a purpose built online questionnaire available on QUALTRICS between 15 May and 10 July 2020, during the school closure period for the COVID-19 lockdown in Italy. The respondents were recruited online through convenience sampling (e.g., researcher contacts, survey advertising on social networks, etc).

The sample comprised 27% (n= 95) pre-service teachers, 22% (n= 80) primary school teachers, 28% (n= 99) upper secondary school teachers of humanities (literature, history, geography), and 23% (n= 83) upper secondary school teachers of STEM subjects (maths, science, technology). The majority of participants were female and located in

Northern Italy, and ranged in ages from 21 to 61+ (see Sociodemographic information in Table 1).

Table 4

Table 4 Sociodemographic Characteristics of Participants

Characteristics	Pre-service teachers		Primary teachers		Humanities teachers		Science teachers		Total sample	
	n	%	n	%	n	%	n	%	n	%
Gender										
Female	76	94	70	96	70	81.5	40	59.5	256	83.5
Male	5	6	3	4	16	18.5	27	40.5	51	16.5
Age										
21-30	68	84	15	20.5	3	3.5	5	7.5	91	29.5
31-40	8	10	8	11	6	7	5	7.5	27	9
41-50	5	6	20	27.5	21	24.5	22	33	68	22
51-60	0	0	26	35.5	39	45	23	34	88	29
+61	0	0	4	5.5	17	20	12	18	33	10.5
Location										
Northern-Italy	69	84	64	87	55	65	46	70	234	77
Central-Italy	13	16	7	10	23	27	16	25	59	19
South-Italy	0	0	2	3	7	8	3	5	12	4

4.3.2 Measures.

An online battery of questionnaires, including standardized scales, open-ended questions, and demographic information was administered. The entire questionnaire took about 10-15 minutes to complete.

Teaching Self-efficacy

The subjective sense of success in teaching was assessed using the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran & Hoy, 2001). In this scale, teaching is conceptualized as a complex activity and represents teachers' efficacy as a multi-faceted

construct: efficacy in classroom management (CM), efficacy in promoting student engagement (SE), and efficacy in using instructional strategies (IS).

The short form of SE and IS scales was icluded, for a total of 8 questions (e.g "How much can you assist families in helping their children do well in school?", "To what extent can you provide an alternative explanation or example when students are confused?"). Each item was scored on a 9-point Likert-type scale from 1 (not at all) to 9 (a great deal). These scales presented an excellent internal consistency with a Cronbach's alpha of 0.88 and 0.93, respectively.

Online Teaching Self-efficacy

Online teaching self-efficacy was evaluated using an adaptation of the Teacher Sense of Efficacy Scale (TSES, Tschannen-Moran & Hoy, 2001). The questionnaire had already been modified by Robinia and Anderson (2010) to investigate online teaching efficacy. However, their questionnaire targeted nurse educators in academic institutions. Thus, the two scales (SE and IS) were adapted to assess teaching self-efficacy contextualized for an online environment in primary and secondary schools. The final questionnaire comprised 8 items (e.g. "How much can you assist families online in helping their children do well in school?", "To what extent can you provide online an alternative explanation or example when students are confused?"). Each item was scored on a 9-point Likert-type scale from 1 (not at all) to 9 (a great deal). Cronbach's alpha was respectively 0.91 and 0.89.

Facilitating Conditions

Facilitating conditions were assessed using the "facilitating conditions scale" (Teo, 2011), which comprised three questions ("When I encounter difficulties in using technology, a specific person is available to assist"; "When I encounter difficulties in using technology, I know where to seek assistance"; "When I encounter difficulties in using technology, I am given timely assistance") The scale was assessed on a 7-point Likert scale (1 = strongly disagree and 7 = strongly agree). Cronbach's alpha was 0.85.

Perceived Ease of Use of Technology.

Perceived ease of use of technology was assessed using a 5-item scale derived from Teo's (2011) study (e.g "Learning to use technology is easy for me", "My interaction with technology does not require much effort"). The scale was assessed on a 7-point Likert scale (1 = strongly disagree and 7 = strongly agree). Cronbach's alpha was 0.93.

Basic Technology Skills

Basic technology skills were evaluated using a 3-item scale (e.g., "I am able to use the internet to search for information and resources"; "I am able to use Presentation Software (e.g. Microsoft Powerpoint) for classroom delivery"; Teo, 2009). The scale was assessed on a 7-point Likert scale (1= strongly disagree and 7= strongly agree). Cronbach's alpha was 0.70.

Advanced Technology Skills

Advanced technology skills were evaluated using a 3-item scale proposed by Teo (2009; "I am able to use website Editors, e.g. Microsoft FrontPage, Macromedia Dreamweaver, to create and/or modify web pages.", I am able to use video editing software, e.g. Microsoft MovieMaker, Adobe Premier, UleadVideoStudio"). The scale was assessed on a 7-point Likert scale (1= strongly disagree and 7= strongly agree). Cronbach's alpha was 0.84.

Technology for Pedagogy

The ability to use technology for pedagogical purposes was evaluated by a 4-item scale ("I search, evaluate and select appropriate technological resources to support lesson activities; "I am able to adopt and adapt given IT-based learning activities"; "I can manage technology-based learning activities in a computer laboratory"; "I am able to adopt and adapt activities that incorporate the use of technology to assess pupils' learning and provide immediate and constructive feedback"; Teo, 2009). The scale was assessed on a 7-point Likert scale (1= strongly disagree and 7= strongly agree). Cronbach's alpha was 0.87.

Behavioral Intention to Use Technology

The behavioral intention to use technology was assessed using a 3-item scale (e.g., "I intend to continue to use technology in the future"; "I expect I would use technology in

the future"; Teo, 2011). The scale was assessed on a 7-point Likert scale (1 = strongly disagree and 7 = strongly agree). Cronbach's alpha was 0.94.

Positive and Negative Aspects of Distance Teaching

To gain a deeper understanding of the thoughts and opinions regarding the use of distance teaching, two open-ended questions were included in the questionnaire. The first question ("What do you think are the positive aspects in distance teaching?") aimed at investigating the positive aspects in the use of distance teaching. The second question ("What do you think are the negative aspects in distance teaching?") aimed at shedding light on the difficulties encountered by teachers in the use of distance teaching.

Sociodemographic Information

Finally, sociodemographic information including age, gender, location (region), school grade, and subject taught, was collected.

4.3.3. Ethics

Formal approval for the study was provided by the Bioethics Committee of the University of Bologna. In the informed consent, participants were informed about the purpose of the research and the procedures; the benefits/risks of participating in this study; the rights to decline to participate and to withdraw from the research without consequences according to the Declaration of Helsinki. Participants did not receive incentives or benefits for their participation.

4.3.4. Data Analysis

Quantitative data were analyzed through one-way ANOVAs in SPSS 26 to understand differences between groups (pre-service teachers, primary teachers, secondary school teachers of humanities, and secondary school teachers of science subjects) and when a significant difference was found post-hoc tests were performed (Bonferroni). Qualitative data were analyzed through text analysis and content analysis on Nvivo 11, following the phases suggested by Elo and Kyngäs (2008). Content analysis is a method

that is effective in classification, edition, and comparison of texts to make theoretical inferences. The answers were evaluated in detail by two independent researchers (first and last authors of the article) to check inter-rater reliability. Then, the researchers created codes reflecting the opinions of the participants. Subsequently, related codes were grouped, and themes were created. The process was concluded by interpreting the themes and codes associated with each other.

4.4 Results

4.4.1. Quantitative Findings

Concerning teaching self-efficacy, one-way ANOVA yielded a significant group effect, $F(3,317) = 5.49$, $p = .001$ (Table 2). Bonferroni post-hoc test revealed that pre-service ($M= 54.34$) and primary school teachers ($M= 54.50$) had greater teaching self-efficacy levels than humanities teachers ($M= 50.17$, $se= 1.37$, $p= .02$; $se= 1.40$, $p= .015$, respectively); primary teachers showed higher scores than science teachers ($M= 50.48$, $se= 1.49$, $p= .046$). By contrast, no differences among groups were found in online teaching self-efficacy [$F(3,321) = 0.49$, $p= .68$].

With respect to the facilitating conditions, a significant group effect was found, $F(3, 316) = 6.08$, $p<.001$ (Table 2). Bonferroni post-hoc tests revealed that humanities teachers ($M= 14.87$) and science teachers ($M= 15.39$) showed higher facilitating conditions than primary teachers ($M= 12.50$, $se= 0.70$, $p= .005$; $se= 0.74$, $p= .001$, respectively).

A significant group effect emerged on the perceived ease of use of technology, $F(3,312) = 4.40$, $p= .005$ (Table 2), with lower scores among primary teachers ($M= 22.57$) compared to science teachers ($M= 26.40$; $se= 1.19$, $p= .009$).

The ANOVA run on basic technology skills revealed a significant group effect, [$F(3, 317) = 3.88$, $p= .01$, Table 2], even if differences among groups did not reach a significant level using Bonferroni post-hoc comparisons. The advanced technology skills showed a

significant group effect $F(3, 303) = 7.09$, $p < .001$ (Table 2), with humanities teachers (*M*= 8.11) having lower scores than pre-service (*M*= 10.48, *se*= 0.73, *p*= .016), primary school teachers (*M*= 11.67, *se*= 0.83, $p < .001$) and science colleagues (*M*= 11.00, *se*= 0.85, *p*= .005).

A significant group effect was found with regard to the use of technology for pedagogy, $F(3,299) = 4.95$, *p*= .002 (Table 2). Post-hoc test revealed lower scores among teachers of humanities (*M*= 17.30) compared to science teachers (*M*= 20.68, *se*= 0.90, *p*= .001).

Finally, ANOVA indicated a significant group effect in the behavioral intention to use technology, $F(3,316) = 5.73$, *p*= .001 (Table 2), with the intention of pre-service teachers (*M*= 17.95) significantly greater when compared to primary teachers (*M*= 15.60, *se*= 0.66, *p*= .003), teachers of humanities (*M*= 15.82, *se*= 0.64, *p*= .006) and science teachers (*M*= 15.78, *se*= 0.68, *p*= .010).

Table 5

Table 5 Means, Standard Deviations, and One-way Analyses of Variance of the Variables in Different Groups

Measure	*N*	Preservice	Primary	Humanities	Scientific	F	η^2
		M (SD)	*M (SD)*	*M (SD)*	*M (SD)*		
Self-efficacy	321	54.34 (8.00)	54.50 (9.47)	50.17 (9.97)	50.48 (8.69)	5.49**	.05
Online self-efficacy	325	43.40 (10.21)	43.14 (12.94)	42.11 (11.84)	44.33 (11.45)	0.49	.005
Facilitating conditions	320	13.85 (4.30)	12.50 (4.75)	14.87 (4.60)	15.39 (4.37)	6.08***	.06
Perceived ease of use	316	25.16 (6.67)	22.57 (7.83)	23.32 (7.38)	26.40 (6.35)	4.40**	.04
Behavioral intention to use	320	17.95 (2.67)	15.60 (5.15)	15.82 (4.32)	15.78 (4.51)	5.73**	.05
Basic technology skills	321	19.38 (2.38)	18.45 (3.28)	18.31 (3.06)	19.52 (2.33)	3.88*	.04
Advanced technology skills	307	10.48 (4.82)	11.67 (5.43)	8.11 (4.85)	11.00 (5.60)	7.09***	.07
Technology for pedagogy	303	19.44 (4.37)	19.43 (6.06)	17.30 (6.40)	20.68 (4.99)	4.95**	.05

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

4.4.2 Qualitative Findings

Four main thematic areas emerged from the content analysis: "use of technology"; "social relationship"; "versatility of distance education"; and "quality of lessons". The occurrence of each theme was analyzed for its positive and negative meanings. Consequently, each theme will be described in both these components, as shown in Figure 1.

Figure 3

Figure 3 Thematic Findings of the Qualitative Approach
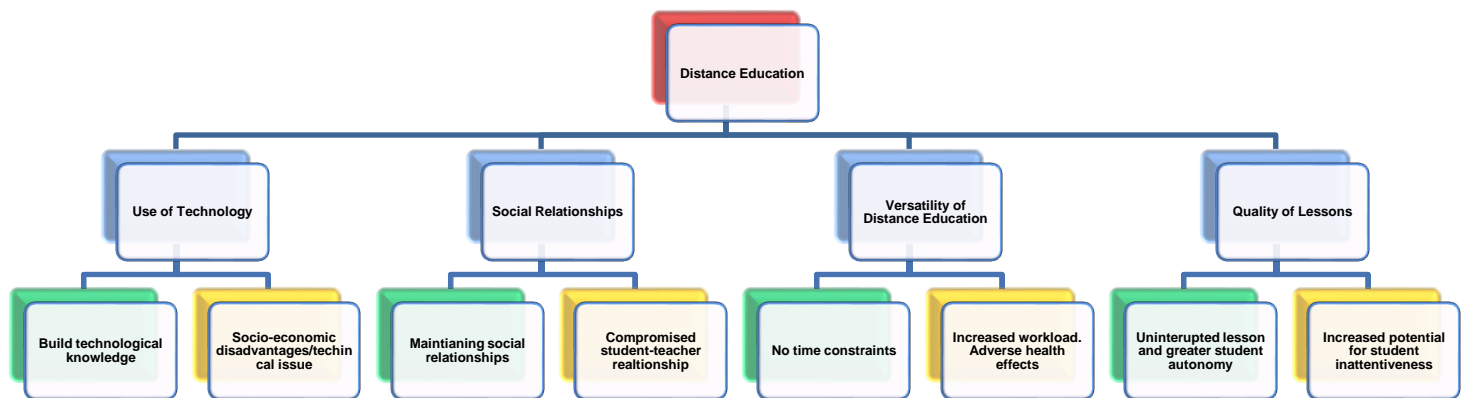
Note. The figure shows the four main themes related to distance education that emerged from the content analysis. Each theme is defined in its positive and negative meaning.

4.4.2.1. The use of technology

Regarding the use of technology as a positive aspect (pre-service teachers: 20 references, 29%; primary school teachers: 25 references, 37%; secondary school teachers of humanities and science: 12 references, 18%; 11 references, 16% respectively), distance teaching provided an opportunity for students and teachers to

increase their often limited technological knowledge, as highlighted by one pre-service teacher: *"Distance education allows improving everyone's computer skills, have students understand the potential of technology and its use beyond its forms of entertainment such as social networks".*

However, many negative aspects in the use of technology emerged too (pre-service teachers: 20 references, 50%; primary teachers: 11 references 28%; humanities teachers: 4 references, 11%; science teachers: 4 references, 11%), implying two principal features. The first one was about social differences: some families may not have their own digital devices, and this would prevent their children from learning in the distance mode and, in turn, it could accentuate existing social differences. For example, one primary teacher wrote: *"Not every student has got powerful tools at their disposal to do online education. It would create inconvenience for connection outages, slowness, etc... and it would become difficult to resume every time a student encounters problems.* The second negative aspect involved technical issues related to technology such as connection problems and the lack of technical skills. As one primary teacher explained *"Live video-conference lessons are not effective: connection problems, time dilatation…. And sometimes students do not have adequate devices, both for economic difficulties and lack of awareness (socio-cultural problem)".*

4.4.2.2. *Social relationships*

Social relationships are part of school daily life. Indeed, students have the chance to learn not only academic content but also how to interact with peers and adults, developing their relational skills. In an emergency period, distance learning represented the only way to continue the educational path and to keep the relationship with students alive (primary teachers: 25 references, 37%; pre-service teachers: 20 references, 29%; science teachers: 12 references, 18%; humanities teachers: 11 references, 16%). Indeed, *as highlighted by one primary teacher:* "*This type of school allows children to*

maintain a certain stability with meeting teachers and their peers, thus giving a sense of belonging and bonding". Furthermore, another primary teacher explained: *"Distance learning has certainly made it possible to keep the relationship between teachers and students alive, to continue their education, and to calm pupils' anxieties"*

Despite its benefit, the interaction mediated by technological devices was interpreted as a major negative factor for most of the sample, regardless of school level (pre-service teachers: 42 references, 25%; primary teachers: 37 references, 23%; humanities teachers: 48 references, 30%; science teachers: 35 references, 22%). Indeed, as reported by an upper science teacher: "*The main channel of the teacher-learner relationship is the empathic and affective relationship established between the two. Distance learning inhibits, or at least limits, this relationship". A similar expression illustrates the sentiment of most of the primary teachers in the study: "The teacher-student relationship is very compromised and less direct, the screen of a computer does not help social relationships, especially in this historical period".*

4.4.2.3. *Versatility of distance education*

Distance education was thought to bring some advantages such as the fact that it can be used regardless of the time of the day, allowing students who for different reasons could not attend class to keep up with their classmates (pre-service teachers: 23 references, 46%; humanities teachers: 19 references, 38%; primary teachers school: 5 references, 6%; science teachers: 3 references, 10%). As one pre-service teacher explained: *"Thanks to distance learning, children who, for whatever reason, might not be able to attend school are allowed to participate in lessons". Aligned with this sentiment one science teacher stated that "For upper secondary school students, it might be an advantage to be able to attend some classes online when they can't be physically present at school (illness, convalescence, problems due to logistics and travel)".*

The downside of this versatility, however, was that it involved a greater amount of work for teachers, and they were concerned for their own and their students' health (humanities teachers: 13 references, 50%; pre-service teachers: 8 references, 27%; primary teachers: 6 references, 19%; science teachers: 1 references, 4%). Indeed, some teachers complained of an excessive workload involving many extra hours compared to normal classroom teaching. One humanities teacher reported that: *"Lack of awareness (even among those who belong to the school field but do not work in the classroom), respect and consideration for the enormous work that teachers must do to try to work seriously and effectively with distance teaching, much more time and effort are needed with the continuing awareness that "an indispensable piece is missing".*

Furthermore, some teachers were concerned that prolonged use of electronic devices could lead to eye or posture problems, as one primary teacher pointed out: *"In addition, doing a continuous number of hours with all class every day would, in my opinion, be quite harmful to the eyes, especially considering that electronic devices are then also used for other activities (texting, calls, research, movies, social media...)".*

4.4.2.4. *Quality of lessons*

Distance education may facilitate the management of the class group, leading to some advantages such as better time management of the lesson and leading to the perception of being heard more by the class group (humanities teachers: 36 references, 39%; primary teachers: 22 references, 24%; science teacher: 18 references, 20%; pre-service teachers: 16 references, 17%). In addition, the possibility of using tools not easily accessible in the classroom, such as sharing platforms, improves students' autonomy and encourages collaborative work. Indeed, as one upper humanities teacher wrote: *"Kids don't chat with each other. I can explain in peace because students don't interrupt. If the students get distracted, I don't notice or get upset."* Similarly, one primary teacher exclaimed: *"There is an incredible speed of information exchange, making students more*

creative and autonomous". Furthermore, one upper science teacher said: "There are no discipline problems, those who are interested are more involved, and more time is given to the student to assimilate concepts".

Some teachers also reported problems due to a lack of student concentration during the lessons. At home, students may be less focused because they have more distractions (pre-service teachers: 32 references, 28%; humanities teachers: 32 references, 28%; primary teachers: 27; 24%; science teachers: 22 references, 20%). Teachers reported that students often kept their cameras off. For instance, one upper school teacher of humanities explained: *"There is a lack of continuous and stimulating feedback from pupils; their contribution to learning during the lesson is often crucial".* The problem became particularly salient when it was time for evaluation as one science teacher reported: *"Great limitations are the assessment and evaluation: it is impossible to check if the tests are carried out regularly, with agreed instruments (for example for students with special education needs), or not. Often students rely more on the search for a ploy than on study and on their own abilities (they are kids)".*

Finally, it is worth noting that 25 teachers reported finding no benefits in distance education when asked to indicate what positive aspects were related to the use of distance teaching, meaning that in their opinion distance education cannot be a useful alternative to classroom teaching in any way. This view was not characteristic of teachers in any grade, or subject area.

4.5. Discussion

The sudden spread of COVID-19 that resulted in school closures posed questions and concerns about the relationship between teaching and technology. In this respect, the present study explored this relationship. On the one hand, factors predisposing the use of technology and how they varied according to teachers' school grade level and teaching subject were evaluated. On the other hand, the opinions, and thoughts of

participants regarding the positive and negative aspects of distance teaching allowed to enrich our understanding and the value of the quantitative data.

Concerning quantitative results, it was found that pre-service and primary school teachers showed a greater level in self-efficacy compared to humanities teachers and that primary teachers had a greater level of self-efficacy compared to science teachers. For what about pre-service teachers, they were likely to have been influenced by their previous 'apprenticeship of observation' model (Lortie, 2020), which is drawn from experiences of their twelve years of schooling, causing them to believe that they were already capable teachers (Pendergast et al., 2011). Another consideration is that some participants could also be parents and may have been influenced by observations of their own children's schooling (Pendergast et al., 2011). Besides, another possible explanation concerns the long period of teaching internship that Italian students had already carried out under the supervision of a senior teacher. Therefore, it is possible that this previous experience in which pre-service teachers watched a senior teacher give instructional practices positively affected their perceived self-efficacy in handling classroom situations (Dassa & Nichols, 2019). For these reasons, a direct link between higher teaching self-efficacy and subsequent competence in classroom practice should not be assumed (Gravett et al., 2011). Instead, this measure represents only pre-service teachers' perception of confidence in teaching and in their own abilities.

With regard to primary teachers, the literature on self-efficacy among different teachers' grade levels is scarce, and the results suggest the need to improve research on this issue. Betoret (2006) for example, found that self-efficacy was slightly higher for primary teachers than secondary teachers, but it did not reach statistical significance. Stephanou and Oikonomou (2018), despite no differences in self-efficacy, found that primary school teachers had a significantly stronger sense of school collective efficacy compared to secondary school teachers. Although the gap in the literature, this difference may be affected by different academic paths. Indeed, the master's degree to become a primary teacher includes several courses on psychological and pedagogical issues. Bu contrast, Italian teachers in secondary schools have obtained a master's

degree in their subject specialization. Thus, it may be that less attention to psychology and pedagogy could affect their self-efficacy, making secondary school teachers less confident in their teaching.

However, when online teaching self-efficacy was assessed, no differences between primary and secondary teachers emerged. This finding should not surprise us. Indeed, distance teaching not only involves a transfer of knowledge from the classroom environment to the virtual one, but it includes broader and different challenges than those involved in traditional face-to-face teaching (Horvitz et al., 2014). Besides, the implementation of distance education met specific difficulties in Italy due the lack of specific information on its management and the developed technological infrastructure as well, factors which are present regardless of teachers' grade level or their subject area (Giovannella, 2020, Pellegrini & Maltinti, 2020).

Regarding the facilitating conditions for distance education and the perceived ease of use of technology, significant differences between teacher groups emerged from the study. Primary teachers showed a lower level of facilitating conditions for distance education than humanities and science teachers and of the perceived ease of use of technology compared to science teachers. However, it could be thought that the research may be mirroring the Italian context, in which the use of technology in primary schools is only a recent development (Oddone, 2016). Therefore, it is likely that secondary teachers (both of humanities and science subjects) may be feel more supported in distance education, perceiving a greater level of facilitating condtions. Moreover, primary school teachers may also have had less experience in using technology and this may have affected their perception of the ease of use of technology which reached a significant difference compared to science teachers who could have had more previous experience using technology (Baki et al., 2018). Furthermore, the present findings would suggest that the greater self-efficacy of primary teachers, but no difference in online self-efficacy when compared to secondary teachers, could suggest that primary teachers were willing, but were perhaps limited in their capacity to easily implement distance education.

In the study, different abilities were included (basic, advanced, and for pedagogy) in using technological systems and a significant group effect concerning basic technological skills was found, even if differences among groups did not reach a significant level. It could be that simple skills (e.g., using word sheets) would have already been attained by most teachers, and would have reached a ceiling effect. By contrast, in terms of advanced technological skills (such as the ability to create and/or modify web pages), or technologies used for education, a significantly lower level of skill was found among teachers. Indeed, humanities teachers showed a lower level of advanced technology skills compared to other groups and of technology for pedagogy compared to science teachers. These results could be explained by considering the pedagogical beliefs of teachers in relation to their subjects. Indeed, as previously discussed, humanities teachers are likely to perceive their subjects as "human-focused nature" (John & La Velle, 2004). For these teachers, communication is essential and the teacher-student connectedness is enhanced using facial expressions and body language (Bao, 2020). On the contrary, science teachers held relatively open attitudes towards the potential of technology to transform teaching, in line with the role of mathematics in the evolution of digital technologies (John & La Velle, 2004). Thus, the forced shift in digital learning may have led to the difficulty, especially for humanities teachers, in their ability to communicate effectively with students and restricted them from generalizing the teaching ability developed in the physical classroom into online contexts, affecting both the advanced technological skills as well as the technology for pedagogy (Putra et al., 2020).

One of the key drivers to integrating technology in teaching (Teo, 2017), the behavioural intention to use technology, was also examined in the study. Pre-service teachers had a significantly higher level of intention to use technology compared to primary teachers, humanities and science teachers. This finding is aligned with previous research in which pre-service teachers reported strong positive beliefs in technology and a solid readiness to use technology in the classroom (Farjon et al., 2019).

The qualitative data in the study provided an appraisal of distance education from the teachers' perspective. One theme was related to the use of technology. Although it is undeniable that learning new tools represents a positive factor in professional development, Italian teachers reported many challenges such as technical problems and the fear that the technology could fuel social differences. Similar concerns were found in a qualitative study by Atmojo and Nugroho (2020) with Indonesian teachers, while contrary findings were found among Finnish teachers (Niemi & Khousa, 2020), who reported only positive aspects related to technology. Besides, looking at our sample differences, it is worth noting that the use of technology to create pedagogical content is mentioned mainly by pre-service and primary school teachers. By contrast, secondary school teachers, mainly from humanities subjects, seem to place more importance on factors related to assessment and lesson quality. These results are consistent with what was found by Legrottaglie and Ligorio (2014) in their qualitative study involving Italian teachers and technology. Indeed, they showed that upper secondary teachers referred to technology as being associated with the didactic dimension and with teaching-learning procedures. By contrast, primary school teachers referred to the dimension of technologies as being capable of creating playful moments.

The social relationship with students was another critical and cross-cutting theme for Italian teachers. While many teachers appreciated the possibility of continuing to see their students, many complained about the lack of a real relationship, for which technological devices cannot compensate. The findings in this respect are aligned with many other studies. For example, Niemi and Kousa (2020) found that Finnish teachers positively valued the opportunity to continue to see their students but, at the same time, they had difficulty creating real interactive relationships with students, feeling that the interaction was too artificial. Hebebhci and colleagues (2020) found similar results among Turkish teachers. When interviewed, many teachers claimed that not being in the same physical environment limited the interaction and that online courses could not replace regular lessons. Finally, Carrillo and Flores (2021), in their literature review about online teaching and learning practices, noted that the social presence in distance

teaching was a topic included in the majority of literature related to distance teaching even before the spread of COVID-19.

Another thematic area was related to the versatility of distance learning, which can be an easy tool when it is not possible to attend in-person classes. However, disadvantages such as increased workload and health hazards were also suggested. While many other qualitative studies have also mentioned adaptability and an increased workload (Kaden, 2020; Niemi & Kousa, 2020; Oliveira et al., 2021), it is interesting to note that Italian teachers, and in particular teachers of the humanities, seemed to have been very worried about their and students' physical health.

The quality of lessons was another theme that emerged from the qualitative data. Teachers suggested that distance lessons facilitated the class's management, especially for humanities teachers, but, at the same time, posed challenges for the evaluation of students' attentiveness. This latter finding aligns with other qualitative studies (Alqurshi, 2020; Niemi & Kousa, 2020; Süğümlü, 2021), which have highlighted the difficulties in monitoring students during lesson evaluations and in receiving immediate feedback. However, in this study, particular emphasis was made by teachers of their concerns for health hazards or the fear that distance teaching could increase social differences.

It is worthwhile to observe that the qualitative results also align with what was found in other quantitative studies. Yang (2020) found that a large sample of primary and secondary Chinese school teachers perceived online teaching as an effective tool, although difficulties with providing online learning and concerns about a possible decrease in learning efficiency were reported. A study by König et al., (2020) found that distance education was reported as involving opportunities and concerns among German teachers. Indeed, thanks to distance education, teachers indicated that they maintained communication with students, introduced new learning content, and provided feedback to their students. However, teachers highlighted the need to improve technology integration, both for online teaching and online assessment. Difficulties and concerns in distance education were reported by a large group of Turkish teachers (Korkmaz & Toraman, 2020) who perceived that the transition to online learning was too

fast. In addition, teachers reported that they were not well prepared for online education practices, lacked experience in preparing e-learning content and technology integration, and reported that there was a lack of connection, both for them and students. A further concern reported in a study of 110 upper school chemistry teachers in the United Kingdom by Turner and colleagues (2020) was the cancellation of final assessment and poor engagement with learning from students.

To sum up, the quantitative findings shed light on factors that can increase teacher readiness to switch to online environments. In this regard, the present results revealed that pre-service teachers showed higher scores in self-efficacy than humanities teachers and in the behavioural intention to use technology compared to the other groups. Primary teachers had a greater level of teaching self-efficacy than secondary school teachers and advanced technology skills than humanities teachers. However, they reported lower level of facilitating conditions compared to secondary school teachers and of perceived ease of use than science teachers. Humanities teachers showed a lower level in advanced technology skills that the other groups and technology for pedagogy compared to science teachers. Finally, science teachers, as primary and humanities teachers, reported lower level of behavioural intention use technology than pre-service teacher while they showed greater levels of facilitating conditions and perceived ease of use than primary teachers and of advanced technology skills and technology for pedagogy than humanities teachers.   On the other hand, qualitative results allowed us to investigate what positive and negative aspects teachers encountered during distance teaching. From the analysis of their answers, the lack of relationship was the main transversal theme with respect to grade levels or subject areas. With regard to the use of technology, both in its positive and negative meaning, was cited especially by pre-service teachers and primary teachers. Concerning the versatility of distance education, it appeared to be present above all among pre-service teachers and humanities teachers, while aspects of lesson quality were present above all among secondary school teachers and less among primary and pre-service teachers.

4.5.1. Limitations

The first study limitation concerns the demographic composition of the sample as the number of females was greater than males, even if in line with the actual Italian context where 78% of teachers are women (OCSE TALIS, 2018). Further research should analyze the role of gender since contrasting results have been reported. For example, in some studies females reported less use of technology than males (Saleh Mahdi & Al-Dera, 2013; Teo et al., 2015), while in other studies no gender differences were described among teachers (Wong & Hanafi, 2007). The second limitation concerns the geographical distribution of the sample because most of the teachers came from Northern Italy. Although Italy has a centralized school system, some differences between the North and South could have affected the findings (Ballarino et al., 2014) Conversely, a more balanced data collection between Northern and Southern Italy would generalize findings. The third limitation implies the low number of teachers from low upper secondary schools in the sample. Further research including this sample would provide insight into how teachers see technology for teaching with pre-adolescent students. The fourth limitation was the qualitative part of the study, which was based on the analysis of open-ended questions. In depth-interviews would certainly have offered a broader view of teachers' personal opinions, shedding further light on relevant details and possible contradictions hidden behind open-ended questions.

4.6. Conclusion

To conclude, the findings may shed light on the positive aspects of distance teaching and how these can be used to improve the integration of technology in the education. On this wave, it could be fruitful to support teachers with technological tools that allow them to provide students immediate and personalized feedback or the possibility of recording video tutorials, webinars, or entire lessons. Of course, it is necessary not just to provide teachers with different training based on their subjects and school grade level

but also to guarantee that schools, educators, and students have appropriate infrastructures to allow every child's participation in distance education, especially those more vulnerable ones. Finally, it is very important to perform follow-up investigations of changes in the perception of participants in this and other surveys, and of the settings in which they operate, to shed light on any persistent effect that the pandemic may have induced.

CHAPTER 5
BULLYING AND CYBERBULLYING

When it comes to the history of the term bullying, a distinction must be made between Eastern and Western cultures. In fact, the term bullying, which is typical of Western cultures, originated in the 1500s (despite, as we will see shortly, with a different meaning); in Eastern cultures, on the other hand, the term has appeared more recently (Morita, 1985) but it is possible to find its anonym in the word "*Ijime*" which als o originated long ago, during the Edo period (1603-1866). According to Morita and colleagues (1999), ijime is similar to bullying since it is a form of aggression that occurs between members of the same class or extracurricular activities. However, ijime often happens just at the psychological level (e.g. group isolation) and rarely at the physical level (Kanetsuna & Smith, 2002).

In the present dissertation, reference is made to the Western definition of the term bullying. In this regard, and as mentioned in the previous lines, its meaning was quite different from its modern definition because "bully" used to mean "sweetheart" (Harper, 2001; Hellström et al., 2021). It was not until the late 17th century that the term bully began to have the negative connotation we give it today (Harper, 2001). With its current meaning, Burk (1897) was the first to report a survey in the United States investigating bullying in schools (Hellström et al., 2021). In his research, bullying was conceptualized as "cases of tyranny among boys and girls from college hazing and school fagging down to the nursery. Cases where threats of exposure, injury, or imaginary dangers were the instruments of subjection and control" (p. 336).

The study of modern bullying originated in Sweden thanks to the seminal work of Dan Olweus. In his early studies, Olweus (1993) defined bullying as follows: "A student is being bullied or victimized when he or she is exposed, repeatedly and over time, to negative actions on part of one or more other students" (Olweus, 1993, p. 9). In particular, negative actions mean "…when someone intentionally inflicts or attempts to inflict, injury or discomfort upon another …" (p. 9). In addition, Olweus (1993) further stated that "in

order to use the term bullying, there should be an imbalance in strength (an asymmetric power relationship)" (p. 10), in which the victim has "difficulty defending him/herself and is somewhat helpless against the student or students who harass" (p. 10).

From the present definition, it is possible to operationalize bullying as a specific act of aggression based on three key components: intentionality, repetition over time, and imbalance of power (Hellström et al., 2021; Thomas et al., 2015). Over the years, different kinds of bullying have been detailed (Byers et al., 2011): overt bullying includes physical aggression (e.g., pushing) and verbal threats (e.g., name-calling, insults), while covert forms comprise aggressions that are not readily visible, such as gossiping or social exclusion.

As technology has rapidly developed and been adopted throughout society, including increased internet access and use, bullying has inevitably evolved. The first definition of cyberbullying comes from Smith and colleagues (2008), who defined it as "an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself" (p. 376). Thus, the first definition considers cyberbullying as a form of bullying perpetuated through electronic devices. However, the debate has been raised regarding how cyberbullying should be conceptualized and defined (Olweus & Limber, 2018). Indeed, on the one hand, many researchers agreed that cyberbullying represents another form of traditional bullying (Berne et al., 2019; Campbell & Bauman, 2018; Kowalski et al., 2014; Smith et al., 2008). By contrast, others claimed that cyberbullying presents distinctive features that distinguish it from face-to-face bullying, like anonymity and the lack of physical and time borders (Menesini & Nocentini, 2009, p. 200; Tokunaga, 2010). Moreover, as many pointed out, it is difficult to address the key components of bullying in the online environment (Corcoran et al., 2015; Cross et al., 2015; Kofoed & Staksrud, 2019). Therefore, despite scholars' great efforts to understand the phenomenon, to date, there is still no agreement about a definition of cyberbullying (Berne et al., 2013; Brewer & Kerslake, 2015; Callaghan et al., 2015; Menin et al., 2021)

as witnessed by the presence of at least 24 different definitions of cyberbullying (for a review see Peter & Petermann, 2018).

The following sections examine the challenges of tailoring bullying components to cyberbullying and whether these phenomena should be considered separately.

5.1 Traditional Elements and Challenges

While in face-to-face bullying repetition is one of the key criteria, its evaluation becomes challenging in cyberbullying (Hellström et al., 2021). Following the traditional definition, a single aggressive act, such as uploading an embarrassing picture to the internet, should not constitute cyberbullying. However, that single act can be saved and shared by numerous witnesses worldwide, resulting in continued and widespread humiliation for the victim (Patchin & Hinduja, 2015). Thus, even without the perpetrator's involvement, a single aggressive act can be enough to cause cybervictimization (Dooley et al., 2009; Menesini & Nocentini, 2009; Slonje & Smith, 2008). Hence, Smith and Steffgen (2013) suggested that repetition should not be considered a necessary component to define cyberbullying; rather, research should focus on how an act of cyberbullying can be transmitted repeatedly through sharing and reposting by other people. In agreement, Olweus and Limber (2018) suggested conceptualizing repetition in cyberbullying differently, taking into consideration, for example, the period of time that the offensive content can remain in online environments or how many people can access the offensive content.

The imbalance of power can be expressed in various ways in traditional bullying. The bully can be superior in physical (e.g., being older or stronger than the victim), psychological (e.g., being particularly wit, self-confident, or relying on advanced verbal skills), social (e.g., being popular in the school, having many friends and social connection) and economic terms (e.g., being from a wealthy family, Hellström et al., 2021). In addition, even when none of the above factors is present, the power imbalance

may result from being aware of some of the victim's vulnerabilities (e.g., family or relationship problems) and using them to cause harm (Thomas et al., 2015). In the online environment, the imbalance of power is extremely difficult to evaluate. Some researchers proposed that superior technology skills may represent an advantage for the cyber perpetrator (Patchin & Hinduja, 2006). However, as Dooley and colleagues noticed (2009), the skills required for cyberbullying someone are straightforward and available to everyone (like creating fake profiles or sending other victims' photos). Thus, other researchers stated that the advantages that cyberbullies possess include the possibility of remaining anonymous (Ansary, 2020; Menesini et al., 2013). Smith and colleagues (2013) summarized these elements, defining the power imbalance in cyberbullying as "differences in technological know-how between perpetrator and victim, relative anonymity, social status, number of friends, or marginalized group position" (p. 36).

Finally, the intention to inflict harm is a key characteristic of bullying, which contributes to its perception as a sub-type of aggression and distinguishes it from accidental, and therefore unintended, damage (Coyne et al., 2011; Hellström et al., 2021). However, it is important to note that not all cyberbullying actions are intended to cause harm to their victims (Antoniadou & Kokkinos, 2015; Skrzypiec et al., 2018). Indeed, a large-scale study by Law et al. (2012) found that despite 30% of students reporting involvement in cyberbullying, 95% claimed that the actions were intended as jokes while not believing that they had any real consequences. The lack of awareness about the consequences of their actions may likely be fostered by the absence of non-verbal social cues and the possibility of anonymity, which may also elicit a lack of moral values as well as a growth of disinhibition (Antoniadou & Kokkinos, 2015; Perren & Gutzwiller-Helfenfinger, 2012; Suler, 2004). Therefore, certain behaviors that were not meant to cause harm can be misinterpreted as cyberbullying and vice versa; as a result, certain behavior may find a target, or even a victim, but not always a bully (Antoniadou & Kokkinos, 2015). However, as Hellström and colleagues (2021) rightly noticed, even if the cyberbullies did not intend to cause harm, at least they should have known that the offensive content would be seen by many others, causing, therefore, harm to the cybervictims.

5.2. Same or Different Phenomena?

Thus, almost 15 years after cyberbullying was first defined (Smith et al., 2008), there is still no agreement on whether or not it should be considered as another kind of bullying with the research itself showing different results.

Olweus (2012), who conducted a large-scale study (450,000 students) in North America and Norway, found that students who had experienced cyberbullying in the U.S. sample reported experiencing traditional bullying about 88% of the time. This percentage was even higher in the Norwegian sample, at 93%. Therefore, Olweus stated that cyberbullying and traditional bullying share a common factor and should be conceptualized as the same phenomenon. In the same vein, Bauman and Newman (2013) found that factor analyses did not distinguish survey items in terms of cyberbullying and traditional bullying, but rather in terms of the type of behavior (such as images, general harassment, and offensive language), indicating cyberbullying is essentially a variation of traditional bullying. Over the years, much other research has confirmed the significant overlap between bullying and cyberbullying (Beltrán-Catalán et al., 2018; Englander et al., 2017; Wolke et al., 2017).

It is important to point out, however, that many authors stated that cyberbullying might be a phenomenon that only partially overlaps with bullying since the relationship between traditional bullying and cyberbullying varies greatly between studies and that the established criteria for bullying do not apply to all cyberbullying incidents (e.g., Bauman, 2010). In addition, other research has argued that students who engage in cyberbullying possess unique characteristics related to the nature of technologies (Tokunaga, 2010). Indeed, cyber incidents can be perceived as worse due to the enduring nature of the online content, the possibility of anonymity of the aggressor, the wider audience and the aggressor's ability to reach the target at any time and place (Campbell et al., 2013; Sticca & Perren, 2013; Tokunaga, 2010).

Brighi and colleagues (2012), for example, identified both unique and common components for traditional bullying and cyberbullying, which may be due to the fact that cyberbullying is a general phenomenon that can be present in many different shapes. An analysis of 1097 Greek students found just a moderate correlation between cyberbullying and traditional bullying (Antoniadou et al., 2019). Similarly, Ybarra, Diener-West, and Leaf (2007) found that 64% of youth who reported being cyber-victimized online were not victimized at school. In addition, the authors showed that children attending schools and students attending home-schools experienced similar rates of cyber-victimization, suggesting that cyber-victimization was not always linked to traditional bullying. According to McLoughlin et al., (2009) some students engage only in cyberbullying/victimization and not in school bullying/victimization. Indeed, cyberbullying can be a form of bullying in which not only students who are socially or physically powerful participate, but also those students who would not dare bully physically. In light of these considerations, some researchers propose either excluding cyberbullying behaviors from the bullying spectrum (and adding them to a broader category of "online aggression") or including just those cyberepisodes that meet all bullying criteria (Patchin & Hinduja, 2012).

To sum up, most researchers seem to agree that cyberbullying and traditional bullying are not entirely distinct phenomena. Indeed, many cyberbullying/victimization incidents result from previous school bullying/victimization involvement, or even an extension of the same. However, the two phenomena may also differ significantly due to the specific features of cyberbullying.

Regardless of the differences and similarities, two aspects are inarguably related to both bullying and cyberbullying: their social nature, in which peers can reinforce the aggressive dynamics, taking on different roles, and the impact that bullying and cyberbullying have on well-being. In this regard, due to the fact that schools are the places where students spend most of their time, school factors may play a crucial role in mediating the impact that bullying and cyberbullying dynamics can have on well-being (Holfeld & Baitz, 2020; Juvonen & Graham, 2014; Rigby, 2000).

5.3. Beyond the Dyadic Perspective

Social-ecological theory considers bullying and cyberbullying as social phenomena that can be conceptualized within the larger social contexts in which they occur (Baldry et al., 2019). This theory is rooted in Bronfenbrenner's (1979) ecological systems theory in which development is viewed as the result of the relationship between the person and the environments to which the individual is exposed.

In this context, peers play crucial roles since they can explicitly and implicitly reinforce aggressive dynamics (Salmivalli & Voeten, 2010). Salmivalli and colleagues (1998) identified six distinct patterns of bullying involvement (Salmivalli et al., 1998). Peers can simultaneously maintain or counteract bullying by playing different roles, in addition to the "classic" roles of bullies and victims. The bully's assistants do not initiate the aggression but join in when someone else does and the bully reinforcers, such as those who cheer and laugh at the bully, who come to observe what is going on, and who incite the bully (assistants and reinforcers have also been labelled "pro-bully", Gini et al., 2021). The defenders support and help the victims, intervene to stop bullying or seek the intervention of an adult. In the periphery, the outsiders – also called "passive bystanders" –don't interfere but rather stay away from bullying episodes. Similar to traditional bullying, roles have been identified in cyberbullying (Menesini & Nocentini, 2009). A pro-bully can support a cyberbully's hurtful actions by sharing, forwarding, or reinforcing the message, the defender plays an active role in comforting the victim or reporting incidents to adults, while the bystander remains an inert observer, refusing to intervene to help the victim (Menesini et al., 2012; Pozzoli & Gini, 2020; Salmivalli et al., 2011).

The behaviors a student adopts in the face of these incidents are critical in increasing or decreasing online and traditional dynamics (Gini et al., 2021). For example, Denny et al. (2015) suggested that prevalence rates could be reduced if students were to be encouraged to take action against bullying. However, for a student to decide to act in

defence of the victim, it is necessary for them to feel involved, thus perceiving bullying and cyberbullying as social phenomena. Indeed, as highlighted by Machackova and colleagues (2015), the awareness that cyberbullying and bullying are group processes and social phenomena highlights the critical role of bystanders, which represents this first step to promoting responsibility and changing the moral rules that promote aggressive behaviors in school and the online environment.

However, despite these bullying involvement roles, it is important to note that bullying and cyberbullying are often considered dyadic phenomena by students, where the focus is just on the bully's and victim's characteristics (Bosacki et al., 2006; Guarini et al., 2019; Mameli et al., 2022; Thornberg & Knutsen, 2011). These findings are essential since they show how prevalent the dyadic perception of bullying and cyberbullying is. However, it is interesting that all the studies examining these roles have been conducted using qualitative and quantitative methods, which suffer from some limitations. Indeed, although quantitative methods are particularly useful to assess generalizability, causality and magnitude of effects in research, they present some limits, like the risk that participants respond in a socially desirable manner. In contrast, data analysis in qualitative methods may be too flexible or not well formulated, being too dependent on the subjectivity of the researcher and may be poorly formulated, being too reliant on the researcher's subjectivity.

Therefore, in order to understand phenomena from different angles, educational and developmental researchers are looking for different methods developed in different academic domains (Lai et al., 2013). Among various techniques, the eye-tracking method is gaining increasing attention.

Eye tracking is a validated method for studing participants' attention and it is based on the "eye-mind" hypothesis proposed by Just and Carpenter (1980), which asserts that eye movements provide dynamic feedback regarding where attention is being directed. Thus, continuous recording of eye movements furnish the most precise measure of attention. In addition, it was found to be less affected by confounding processes (Oar et al., 2022). Over the years, eye-tracking has been widely applied to the study of cognitive

processes and emotional responses such as spatial attention, reading process, aggressive behavior in children and competitiveness in social decision-making (Giacomantonio et al., 2018; Koornneef & Vanberkum, 2006; Troop-Gordon et al., 2018). However, despite the many benefits it could offer, eye-tracking has rarely been used in relation to complex phenomena, such as bullying and cyberbullying.

5.4. Mental Health and Well-being

Several studies have demonstrated that bullying and cyberbullying can adversely affect the well-being of adolescents on multiple levels, being associated with internalizing and externalizing symptoms, as shown by many meta-analyses and reviews (see Del Rey et al., 2022).

Farrington and colleagues (2012) conducted a systematic review of longitudinal studies on bullying, pointing out that involvement in bullying increased the risk of depression an average of seven years later in life, even after controlling for other childhood risks. Similarly, Stapinkski and colleagues (2015) found that adolescents who had been bullied were uniquely likely to exhibit anxiety symptoms and comorbid anxiety and depression, controlling for family, emotional, and behavioral factors. Based on a meta-analysis of 20 years of literature, Hawker and Boulton (2000) revealed that individuals who experienced bullying behaviors were more likely to share negative thoughts directed toward themselves and negative affective states, especially depression symptoms. Despite controlling for pre-existing internalizing symptoms and a range of other covariates, Bowes, et al. (2015) found that over 24% of depression at 18 years of age could be linked to victimization in adolescence. Concerning long-term effects, Ttofi and colleagues (2011) conducted a meta-analysis of longitudinal studies focusing on bullying outcomes finding that bullying experiences during childhood were associated with a greater risk of depression up to 36 years later (with a mean follow-up period of just under seven years).

Online peer victimization has shown similar patterns on mental health and well-being (Tennant et al., 2015). Several longitudinal studies have confirmed a strong association between online peer victimization and adolescents' depression (e.g., Hemphill et al. 2015) and life satisfaction (e.g., Sumter et al. 2012). For example cybervictimization in grade 10 was found to predict depressive symptoms in grade 11 (Hemphill et al., 2015).

In the case of severe involvement in bullying and cyberbullying, the risk of suicide is significantly higher than that for those not involved (Klomek et al., 2010). According to Holt and colleagues (2015), bullying perpetration and bullying/victimization were both associated with an increased chance of experiencing suicidal thoughts and acting on them. Kowalski and colleagues (2014) explored the role of cyberbullying on suicidal thoughts by conducting a meta-analysis of 131 studies. They found that elevated stress levels and suicidal thoughts had the greatest effect sizes with cyber victimization.

It should be noted, however, that the mentioned articles refer just to the presence of mental health symptoms rather on focusing on the concept of general well-being, Indeed, well-being represents a multi-faceted construct which is something more of the lack of negative symptoms (Andreou et al., 2021).

Traditionally, well-being has been viewed mainly centered on hedonic and eudaimonic views (Keyes et al., 2006; McDowell, 2009; Ryan & Deci, 2001;). Happiness and pleasure, as well as the absence of negative moods and life satisfaction, are primarily considered aspects of hedonic well-being (Ryan & Deci, 2001) while eudaimonic well-being is a direct result of the actualization of an individual's potential, the components of autonomy, personal growth, self-acceptance, life purpose, and mastery are integral to this state (Ryff & Keyes, 1995).

In other words, as Keyes (2006) suggested, when pursuing hedonia, people look for general satisfaction and happiness in their life. In contrast, in a eudaimonic context, citizens care more about their abilities and capacities to become well-functioning persons and active citizens.

For the purpose of the present thesis, I decided to focus on well-being as a holistic, positively worded measure including emotional, psychological and social aspect rather than examining the presence of mental health symptoms (Liddle and Carter., 2015).

5.5. The Importance of School for Well-being

Bullying and cyberbullying, as we have seen, severely impact students' mental health. In this context, considering the social nature of these phenomena, the school assumes a vital role in impacting the relationship between well-being and bullying and cyberbullying as it is the environment where students spend most of their time with peers and teachers and where bullying and cyberbullying usually arise.

Regarding peers, as discussed before, the roles that peers play during a bullying or cyberbullying assault are critical in decreasing or increasing the magnitude of the assault. However, the importance of peers is not only expressed in the role that students take on during an assault, but also in the quality of the relationship, which is fundamental in mediating the devastating impact that these dynamics can have on well-being (Holfeld & Baitz, 2020; Juvonen & Graham, 2014; Rigby, 2000). Indeed, victimized children not only were found to have fewer friendships than those not involved, but also they were more likely to increased victimization later on (Hodges et al., 1999; Nansel et al., 2001).

Teachers are another key figure (Guarini et al., 2019), frequently representing the first point of contact in the case of bullying (Wachs et al., 2019). However, although teachers can help reducing bullying and support victims, nearly half of victimized students decide not to speak with them (Sjursø et al., 2019). For example, qualitative research has shown that severe victims perceived that their teachers ignore bullying despite knowing about it, downplay it, or blame the victim. (Bjereld et al., 2017).

Beyond the direct relationship with peers and teachers, previous studies have demonstrated that the feeling of connectedness with the school plays a crucial role in increasing or decreasing peer victimization. In unhealthy school climates, students are

more likely to engage in bullying (Wang et al., 2013). For example, when students perceive conflict, unfriendliness, unfairness, and a lack of support at school or when bullying behavior is normalized and even supported (Gendron et al., 2011; Unnever & Cornell, 2003).

In recent years, research investigating bullying and cyberbullying has focused on considering school factors as mediators in the relationship with well-being (Du et al., 2018; Jenkins et al., 2018; Kochel et al., 2017). Mediators are interposed between independent and dependent variables that statistically explain some amount of their relationship (Hong et al., 2012). Jenkins and colleagues (2017), for example, studied how peer support and teacher support could mediate negative outcomes of victimization such as social and behavioral difficulties. In particular, they found that peer support, but not teacher support, mediated the relation between peer victimization and negative outcomes. In contrast, Villalobos-Parada and colleagues (2016) found that teacher social support had a greater effect than peer social support as a mediator in the inverse relationship between students' peer victimization and life satisfaction, while Lu and colleagues (2020) found that school connectedness mediated the effect of victimization on psychological well-being in a large sample of primary school students.

Although these studies are interesting, some gaps still need to be filled. First, it is still unclear whether school factors (positive peer relationship, teacher support and school connectedness) may have different weights in mediating the relationship between bullying, cyberbullying and well-being. Second, there is a paucity of studies analyzing school factors in relation to cyberbullying, thus making it difficult to understand whether school factors may play a different role between bullying and cyberbullying (Kim et al., 2019). For example, a great deal of research has shown that teachers perceive bullying as an important problem but they have not always seen cyberbullying as a school issue, thus decreasing the likelihood of intervention and decreasing the perceived support for cyberbullying (Craig et al., 2011; Green et al., 2016). As bullying and cyberbullying are both "school problems" (Troop-Gordon et al., 2015), testing models that assess the effects of victimization and cybervictimization on well-being might be important, taking

into account the aforementioned school factors (peer networks, teacher support and school connectedness) as mediators, and investigating the differences between bullying and cyberbullying.

CHAPTER 6
WHAT ROLES MATTER? AN EXPLORATIVE STUDY ON BULLYING AND CYBERBULLYING BY USING THE EYE-TRACKER

A modified version was submitted to the "British Journal of Educational Psychology".

6.1. Introduction

Bullying and cyberbullying represent persistent and widespread problems worldwide (Gaffney et al., 2019; Zych et al., 2015). Bullying is usually defined as a repeated act of intentional aggressiveness perpetrated by one or more students towards another student who cannot easily defend themselves (Smith et al., 2013) and it can occur in different forms. Direct bullying is defined as targeting the victim explicitly, including physical aggression such as hitting, kicking, or pushing the victim, and verbal aggression such as insulting or name-calling. Indirect bullying is more covert and less explicit, including isolating the victim or spreading rumours (Rivers & Smith, 1994). Cyberbullying shares most of the characteristics of traditional bullying but includes some unique and idiosyncratic features that can result in widespread and continuing humiliation for the victim (Campbell & Bauman, 2018; Menesini et al., 2021; Tokunaga, 2010). Despite these differences, bullying and cyberbullying have shown significant overlap (Burton et al., 2013; Hase et al., 2015; Kowalski & Limber, 2013).

6.1.1. Current Approaches to Bullying and Cyberbullying

Data on bullying and cyberbullying have been collected using quantitative and qualitative methods over the past decade (Dennehy et al., 2020; Maran & Begotti, 2021). Quantitative research, which includes self-report measures by students and peer nomination by teachers and classmates, represents the most widely used methodology (Espelage & Swearer, 2003; Maran & Begotti, 2021). The strength associated with self-

report approaches is the validity and reliability of the tools that provide essential information about the individual's perceptions of the frequency and intensity of peer aggression (Hunter et al., 2021; Maran & Begotti, 2021). However, self-reported questionnaires exhibit limitations, as students could under-report their involvement or they may answer in a socially desirable manner (Berne et al., 2013; Rigby & Johnson, 2006). Furthermore, the lack of common definitions across different questionnaires raises doubts about the validity of findings in measuring bullying (Cornell & Bandyopandhyay, 2010; Hunter et al., 2021; Volk et al., 2017). Alternatively, approaches that assess bullying status based on peer and teacher nomination provide independent information on victims, type of aggression, and students' involvement (Espelage & Swearer, 2003; Pellegrini & Bartini, 2000). However, an important source of concern includes possible prejudice or relationship problems not related to bullying (Hymel et al., 1990; Volk et al., 2017).

Concerning qualitative research, studies conducted through interviews or focus groups have enabled exploration, rich descriptions, and interpretation of individual experiences and young people's perceptions of bullying and cyberbullying (Creswell, 2013; Hutson, 2018; Mishna et al., 2008; Maran & Begotti, 2021). However, methodological issues arise, such as the methods of data analysis that may be too flexible or not well formulated (Silverman, 2013) and the subjectivity of the researchers as interpreters (Miller & Crabtree, 1999; Silverman, 2013; Skinner et al., 2000). Likewise, qualitative researchers often emphasize the importance of data over theory (Corbetta, 2003). As a result, theoreticians cannot separate themselves from the obtained data; thus, theories are characterized by differences at the contextual level (Maran & Begotti, 2021). Therefore, **overall, methods used to understand the phenomenon of bullying are subject to limitations.**

6.1.2. A New Approach: Eye-tracking

Given the limitations of the current research approaches, more techniques that allow for a different comprehension of the phenomena may be meaningful in shedding further

light on bullying and cyberbullying. One yet relatively untapped approach is to use eye-tracking. Eye-tracker technology is a validated method of studying visual attention with millisecond precision (Vraga et al., 2016). Moreover, since attentional control processes are largely unconscious and based on habits, it's difficult for participants to adjust their behavior based on social desirability or experimenter expectations (Frey et al., 2000; Graham et al., 2012; Vraga et al., 2016; Weber et al., 2015).

Eye-tracking technology has been widely applied to the study of cognitive processes and emotional responses such as spatial attention, aggressive behaviour in children, and competitiveness in social decision-making (Giacomantonio et al., 2018; Guarini et al., 2020; Koornneef & Vanberkum, 2006; Troop-Gordon et al., 2018). By contrast, only three studies have used it to examine bullying and cyberbullying. Caravita and colleagues (2016) investigated bullying and cyberbullying phenomena by using eye-tracking and found the prosocial video had the lowest number of observations compared to the other types of videos. Troop- Gordon and colleagues (2019) and McConnel and Troop-Gordon (2020) found that while watching bullying video clips, the visual attention of children who had been severely victimized was associated with high levels of attention to the bully and less seeking of adult support. In light of these studies and considering the benefit of using eye-tracking, this technology can be used to investigate students' awareness of the social nature of the bullying and cyberbullying phenomena. Indeed, research using eye-tracking technology may overcome the limits of quantitative and qualitative research methods (Volk et al., 2017).

6.1.3. Bullying Involvement Roles

There is wide agreement that bullying and cyberbullying represent social phenomena that occur within broader social environments (Cross et al., 2015; Gini et al., 2021; Salmivalli et al., 1996; Zych et al.2015; Zych et al., 2018). Therefore, to better understand them, it is necessary to consider how other people's behaviour can support. Despite recent research suggesting that there may be more behavioral patterns than previously

recognized (Belacchi et al., 2021), three common roles are still typically identified: students who side with the perpetrator (assisting and reinforcing behavior), aid the victim (upstanding and defending behavior), or ignore the event (passive behavior; Salmivalli et al., 1998; Salmivalli et al., 2011).

Regarding individuals who side with the bully, two different roles have been highlighted: bully "assistants", who do not start the bullying but join in the aggression, and the bully "reinforcers", who encourage bullying by laughing, watching and inciting the bully (Salmivalli et al., 1996; Salmivalli, 2010). While there are conceptual differences between the reinforcer and assistant, the characteristics and association of these two roles, as well as the factor structure of the instruments used, indicate that they are nearly impossible to distinguish empirically (Gini et al., 2021). Instead, it has been suggested that they may be combined to form one category, labeled "pro-bully" (Jungert et al., 2016; Nocentini, et al., 2013; Thornberg & Jungert, 2013). Countering the bully, one role that has been identified in support of the victim is that of a "defender". Defenders are peers who take action in episodes of bullying by standing up for victims, reporting the incidents to significant adults, or comforting victims (Xie & Ngai, 2020). Separate from these roles are those pupils who withdraw from the scene, deny that bullying is taking place, become avoidant onlookers, or remain silent. They can be categorized as "passive bystanders" (Cowie, 2000; Gini et al., 2008; Menesini et al., 2003; Pozzoli & Gini, 2010; Thornberg et al., 2017).

Similar to traditional bullying, roles have been identified in cyberbullying (Menesini & Nocentini, 2009). Pro-bully can support a cyberbully's hurtful actions by sharing, forwarding, or reinforcing the message, the defender plays an active role in comforting the victim or reporting incidents to adults, while bystander remains inert observers, refusing to intervene to help the victim (Menesini et al., 2003; Pozzoli & Gini, 2020; Salmivalli, et al., 2011).

However, despite these bullying involvement roles, it is important to note that bullying and cyberbullying are often considered dyadic phenomena by students, where the focus is just on the bully's and victim's characteristics. Indeed, previous research has

highlighted that students are not always aware of the different bullying involvement roles (e.g., Slonje et al., 2013), considering bullying and cyberbullying as phenomena involving just the bully and the victim (Bosacki, 2006; Guarini et al., 2019; Mameli et al., 2022; Thornberg and Knutsen, 2011).

A qualitative study by Bosacki (2006) using arts-based methods revealed that students between the ages of 8 and 12, depicted the bully-victim dyad in 93% of their drawings, while only 7% portrayed a more complex group process. A dyadic perception also emerged in a qualitative analysis of students' explanations, which indicated that a large majority attributed bullying just to the individual, while a small minority attributed it to the peer group (Thornberg & Knutsen, 2011). Similar results have been reported concerning cyberbullying, where the roles of the cyberbully and the cybervictim appeared in a greater number of vignettes of comics produced by adolescents (Mameli et al., 2022). Likewise, Guarini and colleagues (2019) found that just around 1% of students aged 11-14 cited roles other than the bully and victim when asked to describe who was involved in the cyberbullying dynamics.

Studying the awareness of the different roles involved in bullying and cyberbullying could be very important. Awareness that other students are involved in the dynamics of bullying and cyberbullying, may represent the first step to promoting student responsibility and changing those behaviors that support and foster the aggression (Haataja et al., 2015). Therefore, it is important to gain more insight into the perception of different roles involved in bullying and cyberbullying, using the eye tracker as a new approach to overcome the limitations of quantitative and qualitative methods.

6.2. The Present Study

The purpose of this study was to understand the differences among the roles, namely bully, victim, pro-bully, defender, and bystander, in attracting the attention of students watching bullying and cyberbullying scenarios. In line with previous research on bullying

and cyberbullying, it was expected that participants would pay more attention to the bully and victim, suggesting a dyadic conception of the phenomena.

I sought to examine differences among the roles using three attentional indexes:

- fixation counts (number of times the participant fixates on a role);

- visit counts (number of visits -step in and out- of a role);

- total fixation durations (total duration for all fixations in a role).

I hypothesized that the bully and victim would receive a greater number of fixation counts, indicating a need for students to explore with more attention the different parts of the bully and the victim's characters than the other roles. Furthermore, it was hypothesized that the bully and the victim would also receive more visits, which would mean that students would have a greater need to step in and out more often in these roles to observe them compared to the other roles. Finally, it was predicted that the fixation duration would vary with the bully and victim roles watched for longer than the other roles, confirming their relevance in the scene.

6.3. Method

6.3.1. Participants and Data Collection

A sample of 50 students in their first year of one lower secondary school volunteered to participate in the study. Students were aged 10-11 years (M= 10.3 years, SD= 3.4 months). All participants lived in Bologna, in the North of Italy. They were Italian except for one student who was born in Saudi Arabia. Concerning the gender composition, 27 students (54%) were males and 23 (46%) females. Students watched bullying scenarios in a private room using eye-tracker technology at their school. The data were collected from December 2021 to January 2022.

6.3.2. Stimuli and Apparatus

Stimuli

Stimuli for the eye-tracking task were composed of 12 vignette drawings representing different types of bullying episodes (Figure 4). There were three drawings for physical bullying, three for verbal bullying, three for relational bullying, and three for cyberbullying. All roles (bully, victim, pro-bully, defender, and bystander) were represented in each scene. The vignettes were drawn by a professional artist specifically recruited for the present study and were based on guidelines derived from existing research. Indeed, the selection of the different types of bullying scenes represented in each vignette was based on the representativeness of bullying experiences for young people, as suggested by several authors (Aricak et al., 2008, Patchin & Hinduja, 2006, Seals & Young, 2003). The creation of the stimuli was also based on Troop-Gordon and colleagues' study (2018), in which six scenes of physical bullying, six of verbal bullying, and six of relational bullying were developed. For each type of bullying (physical, verbal, and relational), I chose three out of the six acts described by Troop-Gordon and colleagues (2018). Three other drawings illustrated acts of cyberbullying and one of them was based on the video by Caravita and colleagues (2016).

The vignettes were gender-balanced. For each type of bullying, one vignette represented only males, one only females, and one was mixed-gender. In summary, the following acts of bullying are depicted.

- Physical bullying: pushing (males), tripping (females), throwing paper balls (mixed, see figure 4a). In the mixed-gender vignette, the bully, the pro-bully, and the bystander were males, while the victim and defender were females.

- Verbal bullying: forcing someone to do someone else's homework (males), teasing about someone's body odour (females), mocking a student's attraction to another student (mixed, see figure 4b). In the mixed-gender vignette, the bully and pro-bully were females, while the victim, defender, and bystander were males.

- Relational bullying: excluding someone from a game (males), spreading rumours (females, see figure 4c), refusing offered food (mixed). In the mixed-gender vignette, the bully, pro-bully, and defender were males, while the victim and bystander were females.

- Cyberbullying: stealing another person's phone (males, see figure 4d), making fun of someone else when watching the phone (females), taking a photo of another person (mixed). In the mixed-gender vignette, the bully, defender, and bystander were females, while the pro-bully and victim were males.

To ensure the context was as neutral as possible and that participants would not be attracted to other stimuli (such as colors) present in the scene not directly related to the bullying episode, each drawing was black and white.

Figure 4 Examples of the Vignettes

1 c) 1 d)
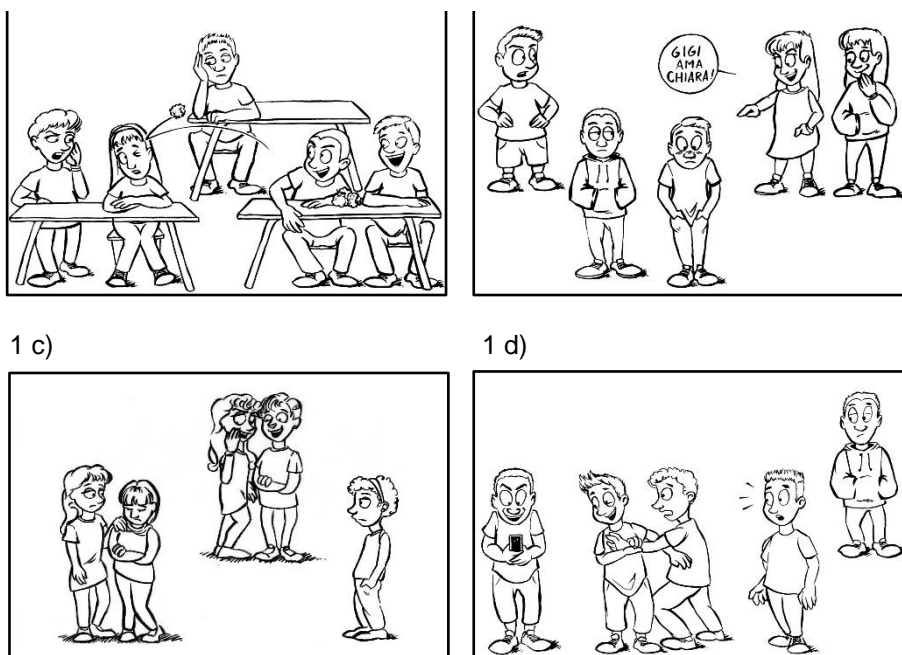
Note. The figure shows four of the twelve vignettes that students watched during the experiment. 4 a) physical bullying, 4 b) verbal bullying, 4 c) relational bullying, and 4 d) cyberbullying. The verbal bullying phrase means "Gigi loves Chiara"

Apparatus

The Tobii Pro X2/60 recorded participants' eye movements, sampling gaze location at 60 Hz. The different role in each scene was considered a separate Area of Interest (AOI) for this study. The Area of Interest (AOI) is a chosen portion of selected regions in a stimulus that allows extracting metrics specific to those locations. Therefore, each vignette presented five different AOI, one for each of the different roles (i.e., bully, victim, pro-bully, defender, bystander) presented in the scene. The following metrics were recorded from each AOI: fixation counts (number of times the participant fixates an AOI), visit counts (number of visits to an AOI), and total fixation durations (in milliseconds, total duration for all fixations within an AOI). The metrics were extracted using Tobii Studio software.

The drawings were displayed to children on a 19 inches monitor at 1600 X 900 pixels resolution. The recommended configuration for children and pre-adolescents which follows a 5-point calibration procedure, was used (Dys, 2018). The calibration process ensured that the eye tracker memorized the characteristics of the participants' eyes and calculated the direction of their gaze on the surface of the screen.

Procedure

The first author conducted the experiment in a dedicated room at the students' schools. After students were seated at a table and in front of the screen, they were told their eye location would be recorded as they watched vignettes about bullying and cyberbullying. The eye tracker was then calibrated and validated to ensure gaze position accuracy of 0.50 degrees or better. No other instructions were given, and there were no time limit constraints. Students could decide when they wanted to move to the next image by pressing the right arrow on the keyboard. The experiment took approximately 5 minutes to complete.

6.3.3. Ethics

The study protocol met the ethical guidelines for the protection of human participants, including adherence to the legal requirements of Italy, and received formal approval by the Bioethics Committee of the University of Bologna. The parents of the children provided their informed written consent for participation in the study, data analysis, and anonymous data publication. Children were free to withdraw from the study at any time if they wished.

6.3.4. Data Analysis

To achieve the aim, the attentional indexes (fixation counts, visit counts, and total fixation durations) were extrapolated for each role (bully, victim, pro-bully, defender, bystander) from each vignette.Ie computed the means of the attentional indexes of each role for each type of bullying (physical, verbal, and relational) and cyberbullying.

I ran repeated measure ANOVAs, using SPSS v28, considering partial eta squared (η_p^2) effect sizes, to understand the differences in fixation counts, visit counts, and total fixation durations among roles within each type of bullying. Four repeated measures, ANOVAs, one for each type of bullying (physical, verbal, relational and cyberbullying), were undertaken with fixation counts as the dependent variable and the different roles as the independent variable (bully, victim, pro-bully, defender, and bystander). The same procedure was followed for analyzing differences in visit counts and total fixation durations as the dependent variables. When a significant difference was found, post-hoc tests, with Bonferroni adjustment, considering Cohen's *d* effect size, were performed.

6.4 Results

6.4.1. Fixation Counts

A significant role effect on the fixation counts in each type of bullying was found (Table 6). In all scenarios, there was a greater fixation on the victim and bully than on any other roles.

Concerning physical bullying, $F(1, 49)= 56.63$, $\eta_p^2= 0.54$, $p< .001$ (Table 6), there was a greater number of fixations on the victim ($M= 9.60$) with a medium effect size compared to the bully ($M= 7.97$, $p= .002$, Cohen's $d= 0.58$) and large effect sizes compared to the other roles (defender: $M= 5.78$, $p< .001$, Cohen's $d= 1.26$; bystander: $M= 4.68$, $p < .001$, Cohen's $d= 1.13$; pro-bully: $M= 3.12$, $p< .001$, Cohen's $d= 1.53$). Fixations on the bully were greater when compared to the defender ($p< .001$, Cohen's $d= 0.72$), the bystander ($p< .001$, Cohen's $d= 0.84$) and the pro-bully ($p< .001$, Cohen's $d= 1.40$), while fixations on the bystander and the defender were greater than the mean fixation on the pro-bully ($p= .004$ and $p< .001$, Cohen's $d= 0.54$ and 0.95).

A significant role effect was also found in verbal bullying, $F(1,49)= 27.75$, $\eta_p^2 = 0.40$, $p< .001$ (Table 6). A higher number of fixations on the victim ($M= 6.93$) and the bully ($M= 6.17$) with large effect sizes when compared to other roles (bystander: $M= 4.51$, $p< .001$ and $p= .041$, Cohen's $d= 0.74$ and 0.43; defender: $M= 3.48$, $p<.001$ for both the comparisons and Cohen's $d= 0.98$ and 0.75; pro-bully: $M= 2.96$, $p< .001$ for both the comparisons and Cohen's $d= 1.09$ and 0.86) were observed. Finally, there was a greater number of fixations on the bystander compared to the pro-bully, ($p< .001$, Cohen's $d= 0.61$).

Relational bullying also presented a significant role effect, $F(1,49)= 28.09$, $\eta_p^2 = 0.36$, $p< .001$ (Table 6). Bonferroni post-hoc revealed that the bully ($M= 7.00$) and the victim ($M= 6.86$) presented higher fixation counts with large effect sizes compared to all the other roles (bystander: $M= 4.54$, $p< .001$ for both the comparisons, Cohen's $d= 0.61$ and 0.69; pro-bully: $M= 3.82$, $p< .001$ for both the comparisons, Cohen's $d= 1.00$ and 1.09; defender: $M= 3.51$, $p< .001$ for both the comparisons, Cohen's $d= 0.99$ and 1.21).

A significant role effect was confirmed in cyberbullying, $F(1,49)= 29,65$, $\eta_p^2 = 0.38$, $p< .001$ (Table 6). Bonferroni post-hoc showed that the victim ($M= 9.34$) and the bully ($M= 8.59$) were the roles with the greatest number of fixation counts and large effect sizes compared to the others roles (defender: $M= 6.79$, $p< .001$, Cohen's $d= 0.88$ for the victim; $p= .012$ and Cohen's $d= 0.49$ for the bully; pro-bully: $M= 5.63$, $p <.001$ for both the comparisons, Cohen's $d= 1.01$ and 0.80; bystander: $M= 4.77$, $p < .001$ for both the

comparisons, Cohen's *d*= 1.08 and 1.05). Moreover, the defender significantly presented a greater number of fixations compared to the bystander (*p*= .002, Cohen's *d*= 0.58).

Table 6 Means, Standard Deviations, and One-Way Analyses of Variance in the Number of Fixation Counts among Roles in Different Forms of Bullying and Cyberbullying

	Bully (A)		Victim (B)		Pro-bully (C)		Defender (D)		Bystander (E)		$F(1,49)$	Bonferroni post-hoc
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*		
Physical bullying	7.97	4.17	9.60	5.16	3.12	3.29	5.78	3.81	4.68	3.54	56.63***	B>A A,B>C,D,E D,E> C
Verbal Bullying	6.17	3.89	6.93	4.19	2..96	2.18	3.48	2.25	4..51	2.87	27.75***	A,B>C,D,E E>C
Relational Bullying	7.00	4.46	6.86	3.96	3.82	3.24	3.51	2.74	4.54	2.38	28.09***	A,B>C,D,E
Cyberbullying	8.59	4.44	9.34	5.18	5.63	3.79	6.79	3.75	4.77	2.97	29.65***	A,B>C,D,E D>E

***p<.001

6.4.2. Visit Counts

The second attentional index included was the visit counts (Table 7). Physical bullying showed a significant role effect, $F(1,49)$= 47.30, η_p^2= 0.25, p< .001 (Table 7). Bonferroni's post-hoc comparisons showed that the victim (*M*= 4.30) and the bully (*M*= 3.84) presented a significantly greater number of visit counts with large effect sizes compared to all the other roles (defender: *M*= 2.55, *p*< .001 for both the comparisons, Cohen's *d*= 1.50 and 0.94; bystander: *M*= 2.26, *p*< .001 for both the comparisons, Cohen's *d*= 1.08 and 0.85; pro-bully: *M*= 1.73, *p*< .001 for both the comparisons Cohen's *d*= 1.25 and 1.35). The defender and the bystander also showed a significant difference compared to the pro-bully (*p*= .011 and *p*= .047, Cohen's *d*= 0.49 and 0.42).

A significant role effect was also found in verbal bullying, $F(1,49)$= 57.80, η_p^2= 0.30, p< .001 (Table 7). Bonferroni post-hoc revealed that the bully (*M*= 3.85) and the victim (*M*= 3.75) presented a greater number of visit counts with large effect sizes than all the other roles (bystander: *M*= 2.18, *p*< .001 for both the comparisons, Cohen's *d*= 1.12 and 1.24; pro-bully: *M*= 1.79, *p*< .001 for both the comparisons, Cohen's *d*= 1.33 and 1.21;

defender: M= 1.69, p< .001 for both the comparisons, Cohen's d= 1.34 and 1.24).

Moreover, the bystander presented a higher number of visit counts than the defender (p= .047, Cohen's d= 0.42).

A significant role effect was confirmed in relational bullying, F(1,49)= 41.98, η_p^2= 0.22, p< .001 (Table 7). Post-hoc comparisons showed that the bully (M= 3.74) and the victim (M= 3.69) received a greater number of visit counts with large effect sizes compared to all the other roles (pro-bully: M= 2.35, p< .001 for both the comparisons, Cohen's d= 1.01 and 0.98; defender: M= 1.99, p< .001 for both the comparisons, Cohen's d= 1.10 and 1.23; bystander: M= 1.75, p< .001 for both the comparisons, Cohen's d= 1.15 and 1.11).

In relation to cyberbullying, ANOVA confirmed a significant role effect, F(1,49)= 36.96, η_p^2= 0.27, p< .001 (Table 7). Bonferroni post-hoc comparisons showed that the victim (M= 4.19) presented the greatest number of visit counts with large effect sizes compared to the other roles (defender: M= 3.49, p< .001, Cohen's d= 0.64; bully: M= 3.10, p< .001, Cohen's d= 0.81; pro-bully: M= 3.07, p< .001, Cohen's d= 0.75; bystander: M= 1.81, p< .001, Cohen's d= 1.40). The defender, the bully and the pro-bully showed higher visit counts compared to the bystander (p< .001 for all the comparisons, Cohen's d= 1.23, 0.90 and 0.82).

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Table 7 Means, Standard Deviations, and One-Way Analyses of Variance in the Number of Visit Counts among Roles in Different Forms of Bullying and Cyberbullying

	Bully (A)		Victim (B)		Pro-bully (C)		Defender (D)		Bystander (E)		F (1,49)	Bonferroni post-hoc
	M	SD	M	SD	M	SD	M	SD	M	SD		
Physical bullying	3.84	1.83	4.30	2.02	1.73	1.58	2.55	1.39	2.26	1.40	47.30***	A,B>C,D,E D,E>C
Verbal Bullying	3.85	1.69	3.75	1.83	1.79	1.21	1.69	0.95	2.18	1.23	57.80***	A,B>C,D,E E>D
Relational Bullying	3.74	2.04	3.69	1.99	2.35	1.82	1.99	1.34	1.75	0.91	41.98***	A,B>C,D,E
Cyberbullying	3.10	1.63	4.19	2.16	3.07	2.01	3.49	1.69	1.81	0.97	36.96***	B>A,C,D,E A,C,D>E

***p<.001

6.4.3. Total Fixation Durations

The third attentional index was the total fixation durations for each AOI (Table 8). In the physical bullying scenario, a significant role effect was found, $F(1,49)= 39.09$, $\eta_p^2= 0.44$, $p< .001$ (Table 8). Bonferroni showed that the victim ($M= 1.97$) presented a longer time of fixations with medium effect size compared to the bully ($M= 1.56$, $p=.003$, Cohen's $d= 0.56$). The victim and the bully presented a longer total fixation durations compared to all the other roles (defender: $M= 1.21$, $p <.001$ and $p= .011$, Cohen's $d= 1.02$ and 0.49; bystander: $M= 0.99$, $p < .001$ for both the comparisons, Cohen's $d= 0.90$ and 0.68; pro-bully: $M= 0.66$, $p < .001$ for both the comparisons, Cohen's $d= 1.24$ and 1.20) Bystanders and defenders were fixed for longer periods of time than pro-bullies ($p= .005$ and $p< .001$, Cohen's $d= 0.53$ and 0.84).

Concerning verbal bullying, a significant role effect was confirmed, $F(1,49)= 16.51$, $\eta_p^2= 0.25$, $p< .001$ (Table 8). Bonferroni post-hoc analysis revealed that the victim ($M= 1.44$) and the bully ($M= 1.24$) showed the longest time of fixations compared to the defender ($M= 0.78$, $p< .001$ and $p=. 004$, Cohen's $d= 0.80$ and 0.53), and the pro-bully ($M= 0.67$, $p< .001$ for both the comparisons, Cohen's $d= 0.89$ and 0.59). In addition, the victim was watched for a significantly longer period of time compared to the bystander ($M= 0.94$, $p< .001$, Cohen's $d= 0.68$). Finally, the bystander received a longer fixation compared to the pro-bully ($p= .048$, Cohen's $d= 0.42$).

The relational bullying showed a significant role effect, $F(1,49) = 23.00$, $\eta_p^2= 0.32$, $p< .001$ (Table 8). Again the victim ($M= 1.52$) and the bully ($M= 1.54$) presented the longest total fixation with a significant difference and large effect sizes when compared to the bystander ($M= 1.03$, $p< .001$ and $p= .008$, Cohen's $d= 0.55$ and 0.51), the pro-bully ($M= 0.82$, $p< .001$ for both the comparisons, Cohen's $d= 0.92$ and 0.95), and the defender ($M= 0.75$, $p< .001$ for both the comparisons, Cohen's $d= 1.04$ and 0.93), and the bystander presented longer fixations compared to the defender ($p= .02$, Cohen's $d= 0.47$).

Also cyberbullying confirmed a significant role effect, $F(1,49)= 27.69$, $\eta_p^2= 0.36$, $p<$ .001 (Table 8). Bonferroni post-hoc showed that the victim ($M= 1.97$) and the bully ($M= 1.78$) attracted the longest duration of time with large and medium effect sizes compared to the other roles (defender: $M= 1.37$, $p< .001$ and $p= .002$, Cohen's $d= 0.89$ and 0.46; pro-bully: $M= 1.14$, $p< .001$ for both the comparisons, Cohen's $d= 0.94$ and 0.75; bystander: $M= 0.93$, $p< .001$ for both the comparisons, Cohen's $d= 1.16$ and 1.00). The defender showed a longer time of fixations than the bystander ($p< .001$, Cohen's $d= 0.63$).

Table 8 Means, Standard Deviations, and One-Way Analyses of Variance in Total Fixation Duration among Roles in Different Forms of Bullying and Cyberbullying

	Bully (A)		Victim (B)		Pro-bully (C)		Defender (D)		Bystander (E)		F (1,49)	Bonferroni post-hoc
	M	SD	M	SD	M	SD	M	SD	M	SD		
Physical Bullying	1.56	0.95	1.97	1.22	0.66	0.73	1.21	0.88	0.99	0.86	39.09***	B>A A,B>C,D,E D,E>C
Verbal Bullying	1.24	0.98	1.44	1.00	0.67	0.66	0.78	0.55	0.94	0.61	16.51***	A,B>C,D B>E E>C
Relational Bullying	1.54	1.10	1.52	1.01	0.82	0.72	0.75	0.62	1.03	0.60	23.00***	A,B>C,D,E E>D
Cyberbullying	1.78	1.08	1.97	1.18	1.14	0.86	1.37	0.80	0.93	0.64	27.69***	A,B>C,D,E D>E

***p<.001

6.4. Discussion

In the present study, it was investigated whether the eye-tracker could provide insights into students' perceptions of roles in bullying and cyberbullying. Our results highlight that the phenomena are mainly perceived as dyadic among students, confirming findings from previous studies (Bosacki et al., 2006; Guarini et al., 2019; Rigby, 2020; Thornberg & Knutsen, 2011). Indeed, the victim and the bully represented the most observed roles compared to other roles in different types of bullying (physical, verbal, relational) and cyberbullying. Overall, it was surmised that the differences among the dyad and the other

roles could be attributed to different attentional processes. Indeed, literature has commonly identified two different types of attentional process: bottom-up and top-down (Katsuki & Costantinis, 2014). The bottom-up, is often conceived as "stimulus-driven", where the attention is instantly drawn to the most salient stimuli or feature that evokes stronger neural activation (Desimone & Duncan 1995; Wolfe 1994). Using this type of process, it is possible select the most relevant stimuli while filtering out the irrelevant ones, allowing us to respond quickly to different situations (Katsuki & Costantinis, 2014). By contrast, the top-down process happens when the information is actively sought out in the environment, it is based on voluntarily chosen factors and is usually guided by motivation, a-priori knowledge, and goals (Connor et al., 2004; Corbetta & Shulman 2002; Itti & Koch 2001; Vraga, 2016). Although the use of bottom-up and top-down processes has been studied primarily on non-social stimuli, many studies suggest that these processes can also drive the attention in social interaction (Flechsenhar et al., 2018). Similar considerations emerged by the Social Information Processing Model (Crick & Dodge, 1994) as it revealed that the first stages of processing social information involve encoding and interpreting the important primary cues to decide what is the most appropriate behaviour in response to those social cues. Therefore, it appears reasonable that the bully and the victim can attract a bottom-up type of attention, helping students to immediately understand what is happening. In other words, to interpret what is happening, it is more salient to look at those who commit or suffer the aggressive action than those who do not participate directly. By contrast, the attention to the other roles across the different forms of bullying might be explained by a top-down process in which participants tried to interpret the other roles based on their motivation, a-priori knowledge and experiences, and goals linked to the experiment.

In the context of physical bullying, the victim and the bully were the most observed roles across all the metrics considered, confirming a bottom-up process. Within the dyad, results showed that the victim received more fixations with a total longer duration than the bully, meaning that students explored the victim longer and with more attention

compared to the bully, probably because he/she received a direct and physical aggression. Outside the roles of victim and bully, the defender and the bystander were watched significantly more than the pro-bully across all measures. This difference could be explained by the different role functions. Indeed, the defender is the role that has the power to disrupt the flow of aggression, increasing the motivation of the student in fixating on this role for a longer time compared to the pro-bully who reinforces behavior that has already happened. Concerning the bystander, previous research has shown that this role does not often receive fair representation as playing an important role in bullying or cyberbullying. Khanolaine and Seomova (2020) and Warwich and Purdy (2019) found that the bystander was never represented by students as important. In the study, it was surmised that the greater attention paid to the bystander compared to the pro-bully might be due to the effort of the observer in combining their a priori knowledge about these dynamics with the contextual information of the drawings to understand the bystander's intention and function in the scenes. In other words, it is plausible that students recognized that the bystander was part of the scene; however, their function was not immediately clear as for the other roles. Therefore, the greater focus suggests an effort to determine the nature of the bystander role.

Regarding verbal bullying, the results showed that the bully and the victim received a greater number of fixation and visit counts compared to all the other roles. It was also found that the fixation durations for the victim and bully were longer than those for the defender and pro-bully, but only the victim was fixed longer than the bystander. This finding aligns with the study by Bosacki et al. (2006), where they asked students of different ages (8-12 years) to freely draw some bullying scenes. They found that most of the 11–12-year-old students who depicted verbal bullying just drew the 'bully-victim' dyad. It also found that the bystander presented a greater number of visit counts than the defender, indicating that students returned more often to the role of the bystander. Moreover, the bystander received a greater number of fixation counts and a longer fixation compared to the pro-bully, suggesting greater attention towards the bystander.

As it was suggested, the increased focus on the bystander testifies to a top-down mechanism in which students need to explore more of the bystander's role to understand their function in the scenario. Indeed, as other research has suggested, the way in which bystanders respond when witnessing bullying influences the extent to which bullying behavior takes place (Gini et al., 2008). The bystander can decide to ignore the situation, remain passive and, thus, reinforce the victimization, or they can choose to join the defender, and, therefore, stop the aggression (Salmivalli, 1999).

Concerning relational bullying, it was found that the victim and the bully showed higher scores for all three attentional indices compared to other roles, in line with the previous types of bullying and confirming their predominance in the scenes as well as the bottom-up process. Regarding the other roles involved, the only difference was in the total fixation duration between the bystander and the defender. The bystander, once again, was observed longer. Similar to physical and verbal bullying, the increased focus on the bystander could represent the effort of the individual to interpret the role.

With regard to cyberbullying, it was found that the bully and the victim were more observed compared to the others in the fixation counts and total duration fixation. Concerning visit counts, the victim received a greater number of visits than the bully and the other roles, suggesting students felt the need to enter the victim's area of interest more often, probably to observe the victim's relationship with the other roles. In addition, the defender received greater fixation counts and visit counts compared to the bystander. This outcome supports findings by Mameli and colleagues (2022) in scenarios produced by students. They reported that out of a total of 123 vignettes drawn by students, the defender was represented in 41 (33.3%) vignettes whilethe bystander was present in only 4 (3.3%) vignettes.

In conclusion, the present results confirmed that the bully and victim are considered the dominant roles in bullying and cyberbullying incidents. However, the victim was explored longer and with more attention compared to the bully in physical bullying and

cyberbullying. It could be conceivable that, in these types of aggression, the victim is perceived as particularly salient by students and further studies are needed to explore these differences in greater detail. Regarding the other roles, it is noteworthy that the defender captured more attention in physical bullying and cyberbullying, revealing the relevance of this role, as already discussed in the previous paragraph. Differences in the role of the defender among different types of bullying were described by Bauman and colleagues (2020). The authors found that the choice to intervene to stop school bullying was less likely in verbal and social bullying compared to physical bullying. They hypothesized that these types of bullying were so common and normalized that peers do not feel the need for action, decreasing, therefore, the importance of the defender role. Overall, a greater focus on the bystander in physical, verbal, and relational bullying was found and attributed to a greater effort of interpretation required of the bystanders' role and their function in the story.

6.4.1 Limitations

Although this study is an important step in understanding the attention paid to different roles in bullying and cyberbullying, it is not without shortcomings. All the students in the present study were aged 10 to 11 years old. While physical, relational, and verbal bullying are phenomena already present during the primary school (Pouwels et al., 2018) cyberbullying is more typical among older students (De Smet et al., 2018). Understanding how cyberbullying is observed by older students who, potentially, could be more involved in these dynamics, and whether they would have similar responses, would be worthwhile. In addition, even though cyberbullying has received much attention over the past decade, there is still a lack of consensus on exactly how cyberbullying should be conceptualized (Scheithauer et al., 2021). Compared to face-to-face bullying, cyberbullying can happen both in the online environment, e.g., using social networks (Kowalski et al., 2019) and in the physical environment e.g., filming a physical attack on a victim with the aim of distributing it via the internet (Kowalski et al., 2008, 2013). In our study, it was considered cyberbullying in the physical environment, and it is

acknowledged that the behavior of the cyberbullying roles could change in an online environment (Scheithauer et al., 2021).

The study made use of drawings instead of real video scenes with human actors. Indeed, the use of human actors in pictures or movies can increase ecological validity when compared to the use of cartoon characters (Riby & Hancock, 2009). However, I chose drawings as the stimuli to remove some of the socially demanding factors associated with human interactions while representing real and possible scenarios among people (Riby & Hancock, 2009). Moreover, as discussed above, it is necessary to be cautious in the interpretation of data, keeping in mind that the study was exploratory, and the generalizability of findings is limited by the unique methodology. As a matter of fact, eye tracking cannot reveal the processes underlying attention to various types of content (Vraga et al., 2016). Greater attention to the roles could mean more interest to the bully and the victim or it may reflect the effort to think and consider the meaning of the content as it could happen in relation to the bystander. In the future, it would be beneficial to combine eye tracking with other measures to better understand the emotional and cognitive process in bullying and cyberbullying.

Third, it is important to understand whether particular levels of victimization and/or bullying might influence how students observe these scenes. Although the use of drawings instead of real images allowed us to avoid the drawbacks, e.g. emotional appeal of images, it is cannot to be ruled out that particularly severe experiences of victimization affected the patterns of observation. Furthermore, using self-report questionnaires to evaluate the intensity of bullying and cyberbullying, as well as the role each student plays in these dynamics, would be extremely valuable, as this would allow us to understand whether different roles correlate with different types of observations.

6.5. Conclusions

To the best of my knowledge, this is the first study to investigate the role perceptions in bullying and cyberbullying using eye-tracking. The study results underscore the

importance of exploring the two phenomena by expanding and integrating the use of new methodologies, such as the eye-tracker. In this way, it is possible to increase our knowledge of the phenomena and, therefore, address more effective interventions. As such, it might be beneficial to emphasize the importance of the defender, whose role is to stop aggression not just in physical bullying, but in other forms as well. Moreover, by changing the beliefs about the role of the bystander as one of "not-involved", it may be possible to change the dynamics of bullying and cyberbullying.

CHAPTER 7
VICTIMIZATION AND CYBERVICTIMIZATION: THE ROLE OF SCHOOL FACTORS

in preparation

7.1 Introduction

As suggested by meta-analyses, the experience of victimization can adversely affect adolescent well-being (Bowes et al., 2015; Hawker & Boulton, 2000). Indeed, longitudinal and cross-sectional studies indicate that peer victimization and bullying in school are associated with a greater likelihood of developing physical symptoms such as stomachaches, sleeping problems, headaches, and muscle pains (Casper & Card, 2017; Gini & Pozzoli, 2013; Ttofi et al., 2011), depression (Brunstein Klomek et al., 2019; Fredstrom et al., 2011; Vaillancourt et al., 2011), anxiety (Fredstrom et al., 2011), decreased self-esteem (Patchin & Hinduja, 2010) and impact academic performance (Nishina et al., 2005). Online peer victimization has shown similar patterns with several longitudinal studies confirming an association with depression (Hemphill et al., 2015), anxiety (Martínez-Monteagudo et al., 2020) and life satisfaction (Moore et al., 2012). In addition, cybervictimization may be particularly harmful due to particular features of online communication environments, such as no limits of time and space, anonymity, and a potentially large audience (Hase et al., 2015). Furthermore, in severe cases, being bullied and/or cyberbullied also significantly increases suicide risk compared to those who are not victimized (Holt et al., 2015; Klomek et al., 2010; Kowalski et al., 2014).

However, although considerable research has highlighted the direct adverse associations between bullying and cyberbullying victimization and students' well-being, there is less clarity regarding the underlying mechanisms involved in these processes (Chai et al., 2020; Holfeld & Baitz, 2020).

7.1.1. Victimization and Cybervictimization: The Role of School

Social-ecological theory considers bullying and cyberbullying as social phenomena that can be conceptualized within the larger social contexts in which they occur (Baldry et al., 2019; Swearer et al., 2010). This theory is rooted in Bronfenbrenner's (1979) ecological systems theory, in which development is viewed as the result of the relationship between the person and the environments to which the individual is exposed. In this framework, school is a fundamental microsystem environment since it is where bullying often arises and where it can be reinforced or stopped. Indeed, bullying is conceptualized as "a ubiquitous international problem that demands attention in all schools" (Cornell & Shukla, 2018) However, the relationship between school and cyberbullying is more complex (Williford & Depaolis, 2016). Indeed, although many episodes of cyberbullying originate from the offline social context between students who know each other (Mishna et al., 2010; Vandebosch & Van Cleemput, 2009; Wegge et al., 2014), cyberbullying typically takes place outside of school borders and hours, and so fuels questions about the weight of school factors in preventing and responding to it (Cassidy et al., 2013; von Marées & Petermann, 2012).

7.1.2. The Importance of Peers and Teachers

Peers and teachers play an important part in victimization and cybervictimization since they can reinforce or weaken such dynamics through their behavior, for example teachers may support or comfort the victim or peers may join the aggression (Holfeld & Baitz, 2020; Hong et al., 2012; Troop-Gordon, 2015).

However, the study of their mediation effects is less well investigated (Holfeld & Baitz, 2020), even though some authors have pointed to it as fundamental (Holfeld & Baitz, 2020; Juvonen & Graham, 2014; Rigby, 2000). Indeed, Juvonen and Graham (2014) and Rigby (2000) have argued that because bullying is a unique stressor aimed at damaging social relationships and reputation, prolonged victimization can damage, in turn, social relationships with peers and teachers, making victims feel isolated and unable to develop effective relationships.

In this regard, one group of studies that has analyzed the mediation role of peer support found full or partial support for a mediation model. Du and colleagues (2018), for example, found a partial mediation of peer support in the relationship between peer victimization and depression. Wang and colleagues (2011) investigated if classmates' support could mediate the association between victimization and academic adjustment, finding a full mediation for males and a partial mediation for females. Poweulse et al (2011) tested peer support as a mediator and moderator variable in the relationship between victimization and depressive feelings. They did not find any evidence concerning the moderator effect but found a mediation effect with a stronger effect for males than females. Concerning cybervictimization, Ho and colleagues (2020) examined the mediation of peer support in the relationship between cybervictimization and depression in a sample of university students, where they found a partial mediation. Tian and colleagues (2018) confirmed a significant mediation of stressful peer relationships in the relationship between cybervictimization and mental health.

Another group of studies has compared peer and teacher support in the role of mediators, revealing mixed findings. Indeed, Jenkins and colleagues (2018) found that peer support, but not teacher support, significantly presented an indirect effect on the relation between peer victimization and adverse outcomes, while Villalobos-Parada and colleagues (2016) found that teacher support had a greater impact than peer support between students' peer victimization and life satisfaction. Flaspohler et al. (2009) found that teacher and peer support equally mediated the relationship between victims of bullying and quality of life. In a similar vein, Hu and colleagues (2022) examined the relationship between bullying and subjective well-being, considering family support, teacher support and peer support as mediators, and found a significant partial mediation for all the variables. Concerning cybervictimization, Hellfeldt and colleagues (2019) measured the relationship between cybervictimization, anxiety symptoms, depressive symptoms and subjective well-being, and took into account the potential mediation effect of perceived social support from friends and teachers in school. They found that teacher

support partially mediated all three outcomes while peer support only mediated the relationship between anxiety and depression.

To the best of my knowledge, just one study has investigated how peer and teacher support could mediate the relationship between school victimization and well-being and cybervictimization and well-being. This study by Chai et al. (2020) found a partial mediation for both the variables in both bullying and cyberbullying dynamics. However, the sample was limited to Chinese students, from a prevalent collectivist culture (Hu et al., 2022) and did not take into account the potential effect of school connectedness.

7.1.3. The Importance of the School Connectedness

School connectedness can be defined as the feeling of being psychologically attached to one's school or identifying with the school environment (Loukas et al., 2006). Some definitions view school connectedness as a component of the school climate (Acosta et al., 2019; Wilson, 2004), while others argue that connectedness results from the perception of belonging and support from students (Thapa et al., 2013). During the course of the last few years, school connectedness has started to assume more importance in the study of bullying victimization, showing overall that a great sense of school connectedness was associated with a low level of victimization (Acosta et al., 2019; Arango et al., 2019; Dorio et al., 2019). Nevertheless, there remain largely unanswered questions regarding the mechanisms underpinning this relationship (Eugene et al., 2021). In particular, while Hong and Espelage (2012) proposed considering school connectedness as a mediator in the relationship between victimization and well-being, few studies have moved in that direction, especially regarding cyberbullying.

Liu and colleagues (2020) found that school connectedness and feelings of hope significantly partially mediated the relationship between victimization and emotional difficulties and life satisfaction. Similarly, Carney et al. (2022) discovered that school connectedness partially mediated the association between victimization and life

satisfaction. Regarding cyberbullying, Holfeld and Baitz (2020) found that school connectedness partially mediated the association between cybervictimization and internalizing symptoms.

To the best of my knowledge, no previous studies have investigated how school connectedness could mediate the relationship between bullying and well-being and cyberbullying and well-being and no previous research has considered school connectedness with peer relationships and teacher support as possible mediators.

7.2. The Present Study

In the present study, the social-ecological framework (Brofenbrenner, 1989) was utilised to investigate how the peer network, teacher support, and school connectedness mediated the relationship between victimization, cybervictimization and well-being.
It was hypothesized that victimization and cybervictimization could trigger additional negative events, such as poor relationships with peers, perceptions of perceived support from teachers, and a lack of school connectedness, and that part of the association between victimization and well-being might be, therefore, referable to these secondary relational stressors. In other words, bullying and cyberbullying victims may experience adverse relationships with peers and teachers as well as a diminished sense of connection with their schools, which, in turn, may mediate the correlation between victimization, cybervictimization and well-being.

The present study aims at filling two gaps in the literature. Firstly, it delves into the unclear mediating mechanisms of the school context (Chai et al., 2020; Eugene et al., 2021) by focusing on relationships with the key actors (peers and teachers) and feelings of school connectedness. Secondly, it simultaneously considers both bullying and cyberbullying as primary stressors to study whether the weight of school factors in the relationship with well-being may differ.

The current study presents two parallel mediation models. The first one aimed to investigate the relationship between victimization and well-being, considering the mediating effects of peer network, teachers support and school connectedness. The second one included cybervictimization as the predictor with the same mediators. In addition, considering gender differences found in some studies, gender was included as a covariate. Thus, the research hypotheses were:

Model 1

Direct effect

Hypothesis 1(H1): victimization is directly associated with well-being.

Hypothesis 2 (H2): victimization s is directly associated with peer network.

Hypothesis 3 (H3): victimization is directly associated with teacher support.

Hypothesis 4 (H4): victimization is directly associated with school connectedness.

Indirect effect

Hypothesis 5 (H5): victimization is indirectly associated with well-being through the peer network.

Hypothesis 6 (H6): victimization is indirectly associated with well-being through teacher support.

Hypothesis 7 (H7): victimization is indirectly associated with well-being through school connectedness.

Model 2

Direct effect

Hypothesis 8 (H8): cybervictimization is directly associated with well-being.

Hypothesis 9 (H9): cybervictimization is directly associated with the peer network.

Hypothesis 10 (H10): cybervictimization is directly associated with teacher support.

Hypothesis 11 (H11): cybervictimization is directly associated with school connectedness.

Indirect effect

Hypothesis 12 (H12): cybervictimization is indirectly associated with well-being through the peer network.

Hypothesis 13 (H13): cybervictimization is indirectly associated with well-being through teacher support.

Hypothesis 14 (H14): cybervictimization is indirectly associated with well-being through school connectedness.

7.3. Methods.

7.3.1. Participants

A convenience sample of students from seven lower secondary schools located Emilia-Romagna region (North-Centre of Italy) formed the study sample. The study was conducted with the consent of the school principal, who was contacted via email and confirmed school participation. An online questionnaire available on QUALTRICS was administered during school hours, taking about twenty minutes to complete. Teachers and the research team were present during the administration to help students for any reason. A total of 667 students took part in the study. However, 104 students did not complete all the scales used for the purpose of the study and were therefore excluded. Thus, the final sample consisted of 563 students (308 males, 55%; 255 females, 45%). The age of participants ranged from 10 to 14 (M= 11.50, SD= 0.63). In relation to year level, 317 students (56%) were in the fifth grade while 246 students (44%) were in the sixth grade. Most students (n= 494, 90%) were Italian, and 102 (18%) had at least one non-Italian parent.

7.3.2 Measures

Students were asked to answer a questionnaire consisting of 6 sections.

Peer Victimization

The Italian version of the European Bullying Intervention Project Questionnaire, EBIP-Q (Brighi et al., 2012) was used to assess involvement in peer victimization in the last two months. The scale is composed of 7 items to evaluate different forms of bullying

victimization (e.g., *"Someone has threatened me"; "Someone has spread rumors about me"*) It is based on a Likert-type scale from 0 to 4 (where 0= never and 4= more than once a week). Good overall reliability was obtained (Cronbach's α= .78).

Cybervictimization

The Italian version of the European Cyberbullying Intervention Project Questionnaire, ECIP-Q (Brighi et al., 2012) was used to assess involvement in cybervictimization in the last 2 months. The scale is composed of 11 items to assess different forms of cybervictimization (e.g., *"Someone spread rumors about me online"; "Someone created a fake account pretending to be me online"*). It is based on a Likert-type scale from 0 to 4 (where 0= never and 4= more than once a week). The overall reliability was good (Cronbach's α= .80).

Well-being

The "Stirling Children's Well-being Scale" (SCWBS; Liddle and Carter, 2015) was used to assess the level of well-being. The scale consists of two subscales: "positive emotional state" (6 items, e.g., "*I think there are many things that I can be proud of*") and "positive outlook" (6 items, e.g., "*I've been feeling cheerful about things*"). It is based on a 5-point Likert-type scale (from 0= never to 4 = all of the time). Good overall reliability was obtained (Cronbach's α= .88), as well as reliability for the sub-scales of positive emotional state (Cronbach's α= .78) and positive outlook (Cronbach's α= .76).

Peer Social Network

The subscale "Peer Social Network" from the School-wide Climate Scale (SCS, Munoz et al., 2018) was used to assess the strength of the peer social network microsystem in terms of the personal and socio-emotional development of students. The subscale is composed of nine items (e.g., "*The students at the school get along well*", "*My classmates help me when I need their help*") on a 5-point Likert-type scale (where 0= never and 4= always). Good overall reliability was obtained (Cronbach's α= .85).

Teacher Support

To assess student-teacher connectedness, the subscale "Teacher Support" from the scale "Teacher-Student Connectedness" was employed (Garcìa-Moya et al., 2020). The

subscale consists of five items, and it measures students' perceptions of having supportive teachers (e.g., "*I have at least one teacher that is there for me if I need their help*", "*I have at least one teacher that is supportive of me and tries to help me*"). It is based on a 5-point Likert-type scale (where 0= never and 4= always). The internal validity was good (Cronbach's *α*= .87).

School Connectedness

To assess school connectedness, participants answered five items from the Add Health School Connectedness scale included in the "California Healthy Kids Survey" (CHKS, Furlon et al., 2011). Questions concerned how participants felt about their school community (e.g., *"I am happy to be at this school", "I feel safe at my school"*). A Likert scale of 5 points was used (where 0= strongly disagree and 4= strongly agree). Furlong and colleagues (2011) tested the scale's reliability, concurrent validity, and unidimensionality with a large, ethnically diverse sample, confiming that the scale was valid and reliable and represented a unidimensional construct. Similar to the results from previous research, good internal consistency for the measure was found in the present study (Cronbach's *α*= .80).

7.3.3. Ethics

The study protocol met the ethical guidelines for the protection of human participants, including adherence to the legal requirements of Italy, and received formal approval from the Bioethics Committee, University of Bologna. Both parents, when possible, gave their informed written consent for participation in the study. In addition, as part of the survey, students were informed that their participation was anonymous and voluntary and that they could withdraw from the study at any time.

7.3.4. Data Analysis

To check for the normality of the data, it was considered values of skewness and kurtosis: these values must be lower than 2 in absolute numbers for a normal distribution

to be considered acceptable (Gravetter et al. 2020). Since the normality of the victimization and cybervictimization distribution was rejected, bivariate correlations were performed using Spearman's correlation coefficient (Table 9).

Table 9 Descriptive Analyses and Correlations for Studied Variables

	Variable	M	SD	1	2	3	4	5	6	7
1.	Victimization	0.59	0.64	-						
2.	Cybervictimization	0.16	0.31	0.465	-					
3.	School Connectedness	2.75	0.89	-0.151**	-0.143**	-				
4.	Teacher Support	2.00	0.73	-0.163**	-0.096*	0.441**	-			
5.	Peer network	2.65	0.73	-0.220**	-0.194**	0.539**	0.409**	-		
6.	Well-being	2.38	0.79	-0.191**	-0.205**	0.427**	0.317**	0.524**	-	
7.	Gender	-	-	-0.014	0.039	0.041	0.053	0.047	-0.062	-

Note. Cell entries are zero-order Spearman correlation coefficients.

*$p < .05$. **$p < .01$.

To evaluate the relative contribution of the potential mediators in the relationship between victimization, cybervictimization and well-being, two parallel multiple mediation models using PROCESS macro were run (Hayes, 2013). PROCESS is a computational tool available for SPSS, which estimates all standard errors, path coefficients, confidence intervals, t- and p-values, and other statistics useful for mediation analysis. PROCESS uses ordinary least squares regression to estimate the parameters of each of the equations. In addition, it estimates each equation separately, meaning that the estimation of the regression parameters in one of the equations does not affect the estimation of the parameters in any other equations defining a model (Hayes, 2013). To address the hypotheses formulated in the present research, two mediation models with multiple mediators were presented so that independent contributions to the indirect pathway from the predictor to the outcome can be estimated. When the lower limit confidence interval

(LLCI) and upper limit confidence interval (ULCI) do not cross zero, it indicates a significant indirect pathway. A comprehensive overview of mediation analysis can be found in Hayes (2013).

Two models were conducted using victimization (Figure 5) and cybervictimization (Figure 6) as predictors, with well-being as the outcome and peer social network, teacher support and school connectedness as parallel multiple mediators. Finally, the potential effect of gender as a covariate was considered. To determine whether one mediator has a stronger indirect effect than the other, a contrast analysis was conducted (Hayes, 2013 Preacher & Hayes 2008).

The two models ran 500 bootstrap samples and 95% confidence intervals are reported. All analyses included a correction for heteroscedasticity (HC3) and the standardized effects (Davidson & MacKinnon, 1993), in line with the recommendations of Hayes and Cai (2007). The independent and mediating variables were centered at a mean of 0 to make the effects interpretable (Hayes, 2017).

## 7.4. Results

7.4.1 Peer Victimization and Well-being

The first model involved victimization as a predictor (Figure 5). The model was significant [$F_{(8,169)}$= 34.35, $p \leq$ .001, R^2= 0.34] and explained 34% of the variability in the data. Gender used as a control variable showed a significant effect (b=- 0.141, p= .010) as females experienced a lower level of well-being compared to males. Concerning the direct effects, victimization did not reveal a significant and direct association with well-being (b= -0.045, p= .372, Table 10), thus rejecting H1. However, the predictor presented a significant and direct association with the peer network [$F_{(8,169)}$= 10.70, b=-0.195, $p \leq$ .001, R^2= 0.04], teacher support [$F_{(8,169)}$= 8.32, b= -0.167, $p \leq$ .001, R^2= 0.03], and school connectedness [$F_{(8,169)}$= 8.38, b= -0.167, $p \leq$ .001, R^2= 0.03], confirming H2, H3, and H4 respectively (Table 10). Concerning the indirect effects,

victimization showed a significant relationship through the peer network and school connectedness (*b*= 0.45, *p*≤ .001;*b*= 0.13, *p*= .007, Figure 5), while teacher support did not mediate the relationship (*b*= 0.06, *p*= 0.16, Figure 5). Therefore, H5 and H7 were accepted, while H6 was rejected (Table 10). Regarding gender, it did not show a significant effect on any of the mediators (respectively *b*= 0.04, *p*= 0.326; *b*= 0.05, *p*= 0.267; *b*= 0.03, *p*= 0.400).

Thus, the relationship between victimization and well-being was fully mediated by the effect of the peer network and school connectedness.

Significant contrasts between peer networks and school connectedness revealed that peer networks was the strongest mediator (Effect= -0.065, Boot LLCI= -0.113, Boot ULLCI= -0.113).

Figure 5 Path Coefficients of the First Multiple Mediation Model
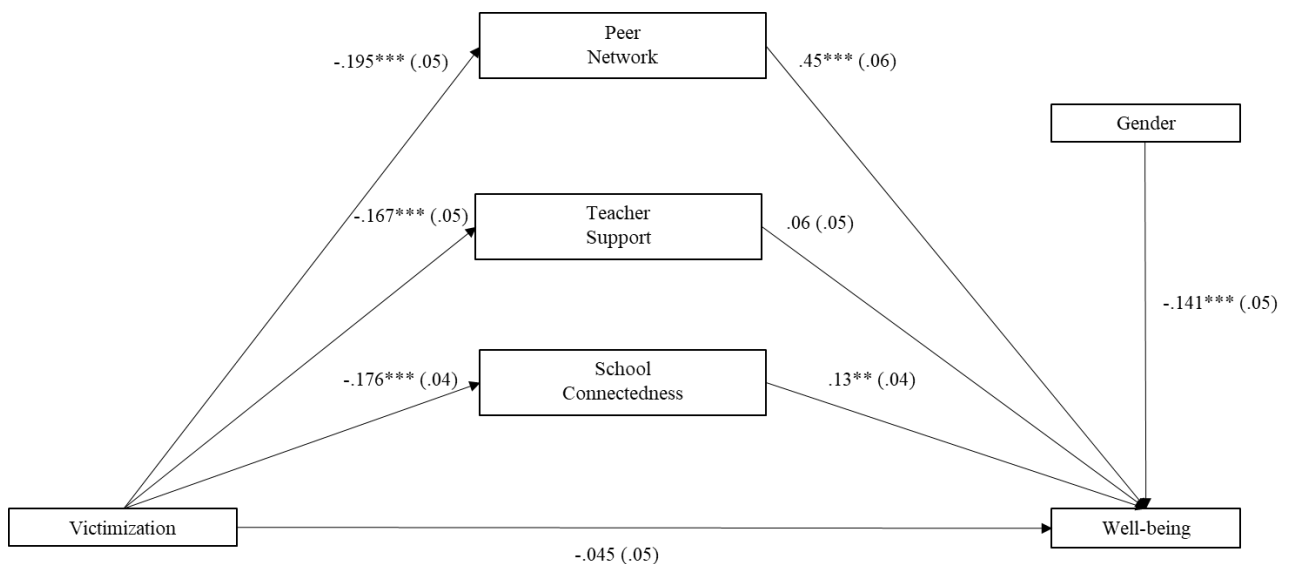
Note. Standardized regression coefficients are shown with standard error in bracket, b (SE).

 ***p* < .01. ***p < .0001

Table 10

Results of the First Parallel Mediation Model

	Path	*95% C.I (Lower)*	*95% C.I (Upper)*	Results
Total Effect	Victimization—> Well-being	-0.301	-0.091	Significant
Direct Effects	Victimization—> Well-being	-0.144	0.054	H1 rejected
	Victimization—> Peer Network	-0.322	-0.125	H2 accepted
	Victimization—> Teacher Support	-0.294	-0.089	H3 accepted
	Victimization—> School Connectedness	-0.368	-0.123	H4 accepted
Indirect Effects	Victimization—> Peer Network —>Well-being	-0.132	-0.049	H5 accepted (full mediation)
	Victimization —>Teacher Support—>Well-being	-0.028	0.004	H6 rejected
	Victimization —> School Connectedness—>Well-being	-0.046	-0.006	H7 accepted (full mediation)

Note. The table illustrates the total effect, the direct effects and the indirect effects of the predictor (victimization) on the outcome.

7.4.2. Cyberbullying Victimization and Well-Being

The second model used cybervictimization as the predictor. Similarly to peer victimization, the model was significant [$F(8,169)= 40.13$, $p \leq .001$, $R^2= 0.34$, Figure 6], and explained 34% of the variability in the data. Gender was significantly associated with well-being ($b= -0.142$, $p= .009$).

Concerning the direct effect, no significant direct effect was found between cybervictimization and well-being ($b= 0.066$, $p= .70$, Figure 6), rejecting H8 (Table 11). However, cybervictimization presented a significant direct effect on the peer network [$F(8,169)= 9.83$, $b= -0.213$, $p \leq .001$, $R^2= 0.05$], on teacher support [$F(8,169)= 4.35$, $b= -0.140$, $p \leq .001$, $R^2 = 0.02$,] and on school connectedness [$F(8,169)= 7.86$, $b= -0.190$, $p \leq$

.001, R^2= 0.04], accepting H9, H10 and H11 (Table 11). Regarding gender, it did not show a significant effect on any of the mediators (respectively b= 0.03, p= 0.362; b= 0.06, p= 0.288; b= 0.03, p= 0.380). Regarding the indirect effects, cybervictimization presented a significant indirect effect on well-being through the peer network and school connectedness (b= 0.45, p≤ .001; b= 0.13, p= .006, respectively, Figure 5 and Table 11), while teacher support did not mediate the relationship (b= 0.06, p= .15, Figure 5). Therefore, H12 and H14 were accepted, while H13 was rejected (Table 11).

Similar peer victimization, the relationship between cybervictimization and well-being was fully mediated by the effect of the peer network and school connectedness.

Contrast comparisons to verify the mediators' strengths showed that the peer network represented the strongest mediator when compared to school connectedness (Effect= -0.070, Boot LLCI= -0.121, Boot ULLCI= -0.025).

Figure 6 Path Coefficients of the Second Multiple Mediation Model
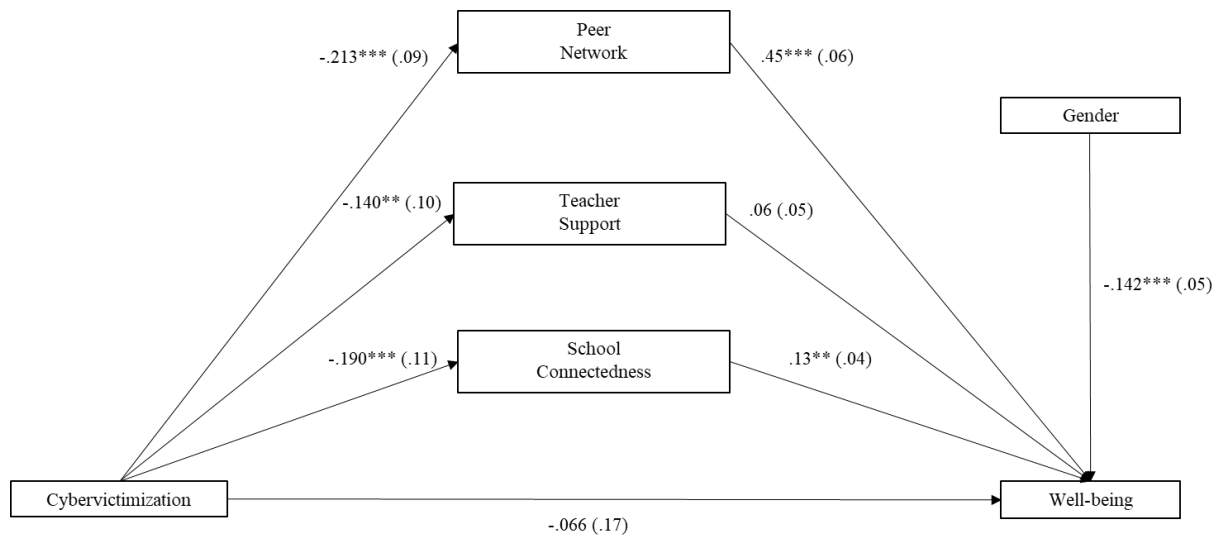
Note. Standardized regression coefficients are shown with standard error in bracket, B(SE).

$**p$ < .01. $***p$ < .0001

Table 10 Results of the Second Parallel Mediation Model

	Path	*95% C.I (Lower)*	*95% C.I (Upper)*	Results
Total Effect	Cybervictimization—> Well-being	-0.3011	-0.0911	Significant
Direct Effects	Cybervictimization—> Well-being	-0.4086	0.2765	H8 rejected
	Cybervictimization—> Peer Network	-0.7333	-0.2770	H9 accepted
	Cybervictimization—> Teacher Support	-0.5749	-0.0901	H10 accepted
	Cybervictimization—> School Connectedness	-0.8302	-0.2649	H11 accepted
Indirect Effects	Cybervictimization—> Peer Network —>Well-being	-0.1428	-0.0523	H12 accepted (full mediation)
	Cybervictimization—>Teacher Support—>Well-being	-0.0254	0.0033	H13 rejected
	Cybervictimization—> School Connectedness—>Well-being	-0.0507	-0.0065	H14 accepted (full mediation)

Note. The table illustrates the total effect, the direct effects and the indirect effects of the predictor (cybervictimization) on the outcome.

7.5. Discussion

Past research has found that peer victimization and cybervictimization are associated with poor well-being (see meta-analysis by Kowalski et al., 2014). There are, however, limited studies that have investigated the underlying processes that influence these associations (Chai et al., 2020; Holfeld & Baitz, 2020). The present research attempted to examine how school factors (the peer network, teachers support and school

connectedness) mediated the relationship between victimization, cybervictimization and well-being among a sample of Italian pre-adolescents, taking into account gender differences.

Results revealed a direct effect of peer victimization and cybervictimization on all three mediators but not on well-being. Indeed, the relations between peer victimization and cybervictimization and well-being were fully mediated by the peer network and school connectedness. In other words, adolescents who reported more peer victimization and cybervictimization perceived poorer relationships with peers, less support from teachers, and a lower sense of connection with the school. In turn, poorer relationships in the peer network and in the sense of school connectedness were significantly associated with lower well-being.

These results open the way for some preliminary considerations. First of all, peer victimization and cybervictimization presented the same pathways. These results confirm the importance of school factors in cybervictimization as well, and so suggest a strong continuity with traditional peer victimization, emphasizing the necessity to focus on the social frames surrounding cybervictimization (Guo et al., 2021; Wegge et al., 2014; Zych et al., 2020). Indeed, while the majority of cybervictimization episodes do not directly happen in the school, most of them take place between members of the same social network, usually within the same class (Festl, 2016; Smith et al., 2008), highlighting the strong connection between the two phenomena, in line with other empirical studies (Festl, 2016; Modecki et al., 2014).

Concerning gender, it did not affect the mediators; however, gender was found to have a significant effect in the outcome as females experienced lower levels of well-being compared to males. This result is in line with other studies (Andreou et al., 2020; Attar-Schwartz et al., 2019; Holfeld & Baitz, 2020) and it suggests a greater susceptibility of adolescent girls to experience more distress when it comes to the value and quality of their interpersonal relationships (Ma & Huebner, 2008).

Below the direct and indirect effects are summarized and discussed further.

7.5.1. Direct Effects

Although a significant negative correlation between peer victimization and well-being was observed, the direct effect was not significant when controlling for the mediators. The present finding diverges from other studies focusing on well-being that have found a direct effect between victimization and well-being (Arif et al., 2020; Carney et al., 2022; Du et al., 2018a; Flaspohler et al., 2009). It is noteworthy that the aforementioned studies included only one or two mediators. As Agler and De Boeck noticed (2017), when a mediator is included, the minimum distance between X and Y necessarily increases; as a result, the more mediators are added, the more the portion of variance explained by the predictor decreases. Another explanation could be that well-being encompasses a multitude of domains including growth rates, physical health, family income and wealth beyond just mental health (Pollard & Lee, 2003; Schultze-Lutter et al., 2016). As a result, the experience of victimization and cybervictimization might affect the mental health domain but not the overall construct of well-being. In fact, as Keyes noted (2002). well-being and negative mental health are not apriori mutually exclusive but may rather coexist, thus having an orthogonal rather than bipolar relationship.

In contrast, but as expected, a significant negative effect of peer victimization and cybervictimization on all three mediators was found. Therefore, greater levels of peer victimization and cybervictimization were associated with lower levels in the peer network, school connectedness and teacher support.

Concerning the peer network, students victimized by peers may suffer relationship problems since victims tend to be disliked and unpopular (Loes Pouwels & Garandeau, 2021; Scholte et al., 2007; Sheppard et al., 2019). For example, Rigby and Slee (1991) found that victims were considered "needy" and "demanding". It is conceivable that a similar consequence is present in cybervictimization since the group dynamics are often the same. In addition, cybervictimization can be worse than peer victimization due to adolescents not knowing where to turn or whom to trust if they are victimized online by a peer (Holfeld & Baitz, 2020; Ladd et al., 2017).

Regarding teacher support, the negative relationship with victimization and cybervictimization could be associated with students' reluctance to open up to teachers. Indeed, victims are often hesitant to seek help from teachers, thinking that they will worsen the situation or not take action against peer victimization and cybervictimization (Bradshaw et al., 2007; Ging & O'Higgins Norman, 2016; Sjursø et al., 2019). In this matter, a large volume of research has shown that teachers themselves struggle with intervening (see Mazzone et al., 2021). Therefore, students likely perceive less support because teachers may fail to directly or indirectly support victims by fostering an unsupportive classroom climate.

Concerning the negative association with school connectedness, it may be that victimization and cybervictimization hinder students' feelings of school safety and satisfaction at school, which may weaken their feelings of belonging at the school, in line with previous research (Carney et al., 2022; Cunningham, 2007; Goldstein et al., 2008; Loukas et al., 2012).

7.5.2 Indirect effects

Results showed that the effects of victimization and cybervictimization on well-being were fully mediated by the peer network and school connectedness.

The Peer network represents the strongest mediator, playing a fundamental part in students' everyday life, fostering the acquisition and exploration of new skills and safeguarding against negative influences (Bukowski et al., 1994). Results from this study are consistent with other studies that have found that experiencing issues with peers contributes to lower levels of well-being (Attar-Schwartz et al., 2019).

In terms of the mediation effects of school connectedness, it is assumed to increase well-being by providing feelings of identity, beneficial relationships, emotional protection and effective coping strategies (Prezza & Costantini, 1998; Wandersman & Florin, 2000) fulfilling those psychological needs related to membership and belonging (Nowell &

Boyd, 2014). In this context, it could be that being a victim or cybervictim makes it more challenging to meet those needs of belonging and connection to the school.

Interestingly, a significant effect of teacher support with well-being was not found. This results are in line with other research that has found that teacher support was not a significant mediator (Jenkins et al., 2019) or significantly weaker than peer relationships (Chen et al., 2021). As teacher support appeared to be trending positively on well-being, teacher support may still be relevant, but it may not be sufficient to affect well-being significantly. Probably because students, who seek independence from adults and place a greater value on peers (Bokhorst et al., 2010), may feel that teachers are less likely to understand them.

7.5.3 Limitations

The current research provided important suggestions regarding the study of peer victimization in pre-adolescence. There are, however, some limitations that should be considered when interpreting the results and when planning future research.

Firstly, the present research relied on a cross-sectional method. Future research should integrate the study of victimization and cybervictimization with longitudinal methods to provide further support for the proposed sequence of effects. Secondly, the current study utilized only student self-reports measures. Due to individuals' tendency to provide socially desirable responses, the levels of peer victimization may be underestimated. Third, future research may include other variables at individual and social level such as the use of adaptive coping strategies and perceived parental support. Fourth, the present findings are limited in external validity because sample data were Italian. In the future it could be interesting to compare students' data from different countries. Finally, all the students were aged 10 to 13 years old. In this regard, it would be useful to evaluate the theoretical models among upper secondary school students since cyberbullying is more typical among older students (DeSmet et al., 2018).

7.6. Conclusion

To the best of my knowledge, this is the first study to investigate the associations between victimization, cybervictimization and well-being, considering the simultaneous presence of three different mediators connected to the school setting.

The results highlight the importance of the peer network and school connectedness in mediating the relationship between victimization and cybervictimization and well-being, suggesting a strong continuity between the two phenomena. The results underscore the importance of fostering positive peer interactions and the feeling of school connectedness through specific actions and interventions to create holistic school environments.

8.1 Highlights of the Empirical Studies

The main purpose of the present dissertation was to analyze the impact of technology on school. On the one hand, I focused on how teachers used technology during the spread of COVID-19 for distance education. On the other, considering differences with bullying, I investigated how technology misuse (cyberbullying) may affect peer relationships in school. After describing the relevant literature related to distance education (Chapter 2) and cyberbullying and bullying (Chapter 5), four different empirical studies were presented (Chapters 3-4-6-7). Despite being conceptualized separately, when considered together, a wealth of information through which technology can be incorporated into the school context, revealing both risk and possibilities, is provided.

In this last chapter, I highlight what the studies add to a theoretical, methodological and applicative level. Following that, I describe the limitations and suggestions for future research.

8.2 Theoretical Considerations

Teaching and bullying incorporate social behaviors that lie at the heart of the school experience(Gehlbach, 2010; Mazzone et al., 2021). Indeed, explaining concepts, keeping students on task, and communicating with parents are all social behaviors (Gehlbach, 2010), as is repeatedly teasing, threatening, or beating someone (Smith et al., 2021).

In this matter, Bronfenbrenner's ecological systems theory is relevant for understanding the intersecting role of peers and teachers in the school microsystem (Bronfenbrenner, 1994; Gehlbach, 2010).

Microsystems can be defined as follows:

"…a pattern of activities, social roles, and interpersonal relations experienced by the developing person in a given *face-to-face setting* with particular physical, social, and symbolic features that invite, permit, or inhibit, engagement in sustained, progressively more complex interaction with, and activity in, the immediate environment" (Bronfenbrenner et al., 1996, p. 1645, italic added).

Thus, school represents a fundamental microsystem where student development is mainly affected by the interaction with peers and teachers and by how teachers and peers interact with each other and in turn are influenced by them. In this regard, classroom climate affects teachers' pedagogical choices (Jennings & Greenberg, 2009) and teachers can play a role in preventing or reinforcing the bullying dynamics that occur among peers (Mazzone et al., 2021).

The advent of technology, however, made the school microsystem more complex (Navarro & Tudge, 2022). Indeed, while, according to Brofenbrenner (1996), relationships in the microsystem happen face-to-face, ICT has enabled the same relationships to occur virtually.

As for peer relationships, researchers have been investigating for years the continuity between aggressive interactions in school and digital environments, for example, through cyberbullying studies (Chapter 5). In contrast, the study of teachers' relationships with digital environments had remained in the face-to-face school setting until the arrival of COVID-19, which forced schools to implement distance education (Chapter 2).

Consequently, although the emergency caused by the COVID-19 pandemic has now ended, or at least faded in most countries, researchers and scholars have become increasingly aware of the importance of successfully addressing the role of the school system in the digital environment (Navarro & Tudge, 2022). However, adapting the

school microsystem to an online environment was not easy since cyberspace has important peculiarities, like the possibility of being synchronous and asynchronous, the publicness, the availability and the permanence of digital content (Navarro & Tudge, 2022).

In light of the fact that digital technology is here to stay, it is important to consider whether it is possible to utilize the great possibilities that ICT offers to enhance the educational environment. In this regard, it may be useful to consider integrating Bronfenbrenner's theory of microsystems with other views of development that better lend themselves to the integration of technology.

A fascinating insight comes from the studies by Maffei (2012) on brain plasticity and enriched environment. The term enriched environment indicates the context in which social interactions can take place, where there is a continuous diversity of multisensory data from objects that are able to entice an individual towards spatial exploration encouraging curiosity, thus also exercising visual memory and spatial and promoting voluntary physical exercise (Maffei, 2012). Maffei (2012) found that a more stimulating environment positively influences the brain activity of children, adults and even older people. Thus, it would be interesting to ask if the digital environment can be considered an enriched environment, given that it presents a wide variety of interactive sensory inputs that challenge our brains and require us to adapt to a constantly changing landscape of information in a way that would have been unthinkable ten years ago (Rosen et al., 2015). In this regard, some studies have analyzed the positive aspects of ICT on child development, and found greater levels of flexibility, productivity and the way in which people accomplish tasks thanks to the use of ICT (Hill et al., 2001; Valcour & Hunter, 2005). In addition, beneficial effects in improving learning abilities in children with ADHD were also observed (Choudhury & McKinney, 2013; Obel et al., 2004; Rosen et al., 2015). Maffei (2012), however, raised an interesting point that can be related to the use of technology. Indeed, the author discusses the risk of a "collective brain" in which people continuously exposed to the same stimuli may develop the same thoughts and ideas to the detriment of their own originality. In this case, while digital technologies allow

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for increased communication, interactions and stimuli, they can also lead to the homogenization of ideas. Therefore, in this context, the challenge is not to avoid using digital technology but rather to use it as a tool to broaden own perspective and engage with diverse world views.

A second fascinating suggestion was proposed by the neuroconstructivism framework (Westermann et al., 2007). Indeed, the surrounding environment, both in its dimension physical and social, has a "highly constraining effect on the emergence of neural representations because it restricts the possible experience of the child and offers to her certain ways in which it can be manipulated" (Westermann et al., 2007, p. 78). In this direction, technologies may change physical and social environments with possible positive cascading effects on child development. As suggested by Della Longa and colleagues (2022), indeed, the use of technology alters the way we build relationships with others, emphasizing the importance of the wealth of social cues and feedback that technological devices allow for exchange (Daft & Lengel, 1986) In addition to the characteristics of the ICT, however, the quality of the relationship should also be taken into account, with a focus on the communication processes that take place in virtual environments as a form of interaction that allows people to negotiate and adjust their identities, information, and goals to each other (Smith & Kollock, 1999). Similarly, this thesis sought to show how relationships and education can be altered by the use of technology which is now transferable to the school's microsystem, whether it relates to peer relations or teaching. Indeed, digital technology permeates every aspect of our lives and society, so it is said that digital technology represents society rather than an entity that influences it (Castells, 2000). As follows, there is no longer a singular, unidirectional interaction between technology and people but rather it a complex ad dynamic whole of experiences (Navarro & Tudge, 2022; Plowman, 2019).

Consequently, I think that the crux of the question is not how digital technology can be integrated into the school microcontext but how the school microcontext can enhance social-relational aspects that distinguish it as a fundamental place of development, adapting them to the peculiarities and advantages that digital technology brings with it.

In other words, as underlined by Nesi and colleagues (2022) the use of ICT affects the quality of the relationship by changing their qualitative nature, altering their frequency, amplifying demands and offering new opportunities for novel or compensatory behaviors (Nesi et al., 2018). Thus, digital technology may change traditional social-relational aspects of child development, changing the way the child learns and relates. These changes are not necessarily negative in that they provide the possibility for creating rich and stimulating relational virtual learning environments; at the same time, however, they must be adapted and structured based on the idiosyncratic peculiarities and characteristics that ICT use brings.

8.3 Methodological Considerations

Given the complexity of the school context and its relationship with technology (Navarro & Tudge, 2022), I used different data collection techniques and applied different analyses that would allow the phenomenon to be studied from different angles and perspectives. Therefore, using different tools and analyses helped to provide a better picture of the role of digital technology in the school context.

8.3.1. Data Collection

During the course of this thesis, I combined different tools for data collection to expand the scope of my research since, as Wolfer (1993) stated the nature of reality lends itself to a variety of methods of investigation.

The first tool is the self-report questionnaire (Chapters 3, 4, 7) which is considered the most popular research method for collecting large quantities of data in the psychology field (Field, 2013). Indeed, self-report questionnaires are particularly effective for measuring subject behavior, intentions, preferences, opinions and attitudes (Hunter et al., 2021). In addition, they offer important advantages like cost-efficiency, standardization and comparability among different populations (Fulmer & Frijters, 2009).

Nevertheless, they present some issues like the risk that participants may respond in a socially desirable manner and the limited choice of items offered to the respondent (Reja et al., 2003).

The second tool uses open-ended questions (Chapter 4). Open-ended questions allow individuals to respond to a query in their own words. Several scholars have argued that this type of question allows people to answer freely, helping them understand their salient concerns better than forcing them to choose a fixed set of answers (Geer, 1991). This could also lead to avoiding the unintentional bias that may come from suggesting responses to individuals, as happens in self-report questionnaires (Reja et al., 2003). The analysis presented in Chapter 4 showed the usefulness of a qualitative data approach. Indeed, giving ''voice'' to teachers and letting them describe their individual experiences allowed us to collect richer and more articulate data compared to just that from questionnaires. However, open-ended questions also have disadvantages like the lack of generalizability and the subjectivity of the research, that may affect how the questions are posed and then analyzed (Reja et al., 2003).

To investigate phenomena deeper, it may be useful to use experimental tasks beyond the aforementioned ones (Lai et al., 2013). This consideration leads us to the third tool used in this thesis, namely the eye-tracker during experimental tasks. As we have seen, eye-tracking is a behavioral tool to collect attentional data, rarely used in relation to complex social phenomena. In this regard, Chapter 6 underscores the importance of expanding and integrating the data collection possibilities, opening the door to experimental tools. Indeed, the use of the eye-tracker made it possible to analyze how attention was paid to complex social interactions in a far more detailed fashion than that which is possible by ordinary tools. In addition, eye tracking is considered a promising technique, as it is broadly considered a highly accurate and non-invasive means of measuring participants' focus of attention (Gehrer et al., 2018).

Overall, each tool has specific and distinct strengths. Self-reports have the great advantage of being construct-specific and reliable. However, the way that items are constructed, and the response scale must be considered., The open-ended questions,

on the other hand, allows participants to freely express their thoughts and feelings without having to adhere to predetermined options but great attention must be paid to ensuring that the researcher's own experiences and subjectivity do not influence the methodological process. The main advantages of behavioral approaches are their focus on behaviors that are difficult to control intentionally (e.g., attention to task). However, attention must be paid to the ecological context in which researchers decide to set the experiment (Vraga et al., 2016).

8.3.2. Data Analysis

Looking at the different quantitative analyses proposed throughout the thesis, the use of a moderated moderation model (Chapter 3) and two multiple mediators model (Chapter 7) allowed us to test different research hypotheses, analyzing multivariate processes that can underpin or alter other bivariate relations and better approximating the multifaceted reality from which the data are derived (Fairchil, 2010). Indeed a research design can contain multiple variables, which may modify or inform relationships between variables. For instance, a predictor and an outcome can have complex bivariate relationships; these interactions may be modified by incorporating additional variables (Fairchild & McQuillin, 2010).

Based on Fairchild and McQuillin suggestion (2010), Chapters 3 and 7 focused on the need for complex models to account for the different ways different variables can influence distance education and bullying and cyberbullying.

However, although quantitative methods are particularly useful for assessing generalizability, causality and magnitude of effects, and relationships, they may not be enough. Indeed, to fully understand modern complex phenomena, more than an exclusively quantitative approach may be required as it does not allow for capturing the different nuances or subjective experiences of participants (Plano Clark, 2019). From this perspective, the qualitative analysis may help integrate the results since they are

particularly well suited for describing individual experiences, exploring the reasons or mechanisms behind phenomena and generating theories (Fetters et al., 2013; Plano Clark, 2019). Chapter 4 shows the usefulness of considering content analysis for qualitative data. We codified, categorized and analyzed teachers' words to capture the different nuances or subjective experiences to have a meaningful understanding of the phenomenon (Ochieng, 2009).

Therefore, the use of different analysis has helped us to test different hypothesis expected on theoretical grounds. For example, how perceived ease of use and the online teaching self-efficacy could alter the relationship between the perceived usefulness and the intention to use technology, affecting their strength and providing information about the generalizability of the relation between the predictor and the outcome (Chapter 3) and to understand how the relationship with peers and the sense of school connectedness could mediate the relationship between the victimization, cybervictimization and well-being, (Chapter 7). Finally, the content analysis allowed us to identify , similar concepts whitin data, exploring their relationships of meaning. Such relationships can be used to further develop and corroborate interpretations of theories that seek to investigate the phenomena studied (Allodola, 2014).

8.4 Implications

The present dissertation has important implications for better understanding distance education and the bullying and cyberbullying phenomena and, from a broader perspective, for the adaptation of schools to digital technologies.

In addition to research, institutions and policy have emphasized the importance of integrating technology into schools on multiple levels. Indeed, regarding education, the OECD (2015) and European Commission (2016) stated that digitalization represents a driving force in economic productivity, and thus member states should foster the development of new digitalized learning environments and technology to ensure national

education systems are up to date (Salmieri, 2019). Concerning cyberbullying, the Italian law "*Disposizioni a tutela dei minori per la prevenzione ed il contrasto del fenomeno del cyberbullismo"* (2017) underlined the necessity to prevent cyberbullying in schools by introducing specific activities.

Thus, the school system could benefit from taking multiple actions on different levels and with different actors. In the following paragraphs, several implications are pointed out.

8.4.1. Teachers and Technologies: Actions on More Levels

One of the first emerging implications is the need to train teachers on different levels. Indeed, on the one hand, teachers could benefit from interventions on the use of digital technology for educational purposes as emerged from Chapters 3 and 4; on the other hand, they would need to be trained on the maladaptive use of technologies among students in line with the results from Chapter 7.

Regarding the training for educational purposes, results from Chapter 3 showed that both perceived usefulness, perceived ease of use and online teaching self-efficacy significantly predicted the intention to use technology. In addition, a moderation effect of self-efficacy on the perceived usefulness of using technology was found for medium and high-level of perceived ease of use of technology. Findings from Chapter 4 informed us that teaching self-efficacy was greater in pre-service and primary teachers, while facilitating conditions were greater in humanities and science secondary teachers. The perceived ease of use of technology and technology for pedagogy skills were more pronounced among science secondary teachers. Advanced technology skills were lower in humanities secondary teachers while the behavioural intention to use technology was greatest among pre-service teachers. In addition, four themes emerged from the qualitative analysis about the positive and negative aspects of distance education namely: the use of technology, the relationship with students, the versatility of distance education, and the quality of lessons.

Taken together these results make important suggestions on how to structure technology training interventions for teachers. First of all, it is necessary to make sure that the interventions are aimed at increasing online teaching self-efficacy, the perceived usefulness of technology, and the perceived ease of use; this latter point also emerges from the content analysis of Chapter 4 where many teachers reported, among the negative aspects related to the use of technology, the many technical issues they encountered and they did not know how to solve. Second, it is important that interventions also foster the exchange of knowledge and relationships among teachers and experts, in addition to the mere passing on of technical knowledge. Indeed, among the positive aspects emerged from Chapter 4, the possibility of having relationship with own students and colleagues was emphasized across teachers. It is therefore important to consider not only the content of teacher training but also its mode of delivery, seeking to promote interactive interventions

Third, future training should take into account the quantitative findings from Chapter 4, namely, that many variables associated with the use of technology might vary due to different teachers' grade levels and subjects taught. Primary school teachers, for example, might exhibit lower levels of the use of technology; conversely, secondary school teachers of STEM subjects appeared to be the most likely to integrate technology and recognize it as useful. In this way, it might make sense to divide the content of the interventions by different grade level and subjects.

Overall, it is crucial, as suggested by Saadaf and Gezer (2019), to consider the different factors related to teachers' intentions to integrate digital technologies into their classrooms in order to implement effective strategies to better prepare teachers for embracing technology in their teaching. In this direction, the paucity of digital equipment (Chapter 2) has to be counterbalanced by initiatives leading to new teaching practices, new tools and services, and new models aimed at innovating teaching quality in line with the National Plan for Digital Education (PNSD, 2015).

Regarding anti-bullying and cyberbullying training, results from Chapter 7 inform us that although perceived support from teachers did not impact the relationship between

victimization, cybervictimization, and well-being, victims and cybervictims still perceived a lower level of support from the teachers. Therefore, implementing anti-bullying and cyberbullying training for teachers should also be a priority since students may be more willing to ask for help when they perceive a supportive environment and teachers (Aceves et al., 2010). In addition, involving teachers in training on anti-cyberbullying and the risks associated with using ICT could strengthen their ability to directly address cyberbullying in their daily teaching, which in turn could positively impact the relationship with their students (Veenstra et al., 2014).

However, care must be taken not to overburden teachers with interventions and training to avoid the risk of burnout (Fiorilli et al., 2019). In this sense, interventions should be flexible and based on a teacher needs analysis, which can be explored through focus groups or in-depth interviews.

8.4.2. Fostering Positive Relationship Among Peers

As we have seen throughout this thesis, bullying and cyberbullying are social phenomena in which peers are fundamental. Indeed, peers can play different and dynamics roles in bullying and cyberbullying episodes (Chapter 6). In addition, the quality of the peer relationships represents an important factor in mediating the impact of victimization and cybervictimization on well-being (Chapter 7). Specifically, Chapter 7, found that victimization and cybervictimization had a direct impact on the peer network, the perceived teacher support (as already stated in the above paragraph) and the school connectedness but not on well-being. Indeed indirect effects on well-being were observed through the peer network, the strongest mediator, and school connectedness, both in victimization and cybervictimization.

In Chapter 6, I examined how students' attention, assessed by the number of fixation count, number of fixation duration and the total fixation duration, varied among the different roles when watching different types of bullying and cyberbullying scenarios using the eye-tracker. The results showed that the victim and bully were the most observed roles. The defender was more observed than the pro-bully in physical bullying

and the bystander in cyberbullying, while the bystander was more observed than the pro-bully in psychical, relational and verbal bullying. By contrast, the pro-bully was more observed than the bystander in cyberbullying, suggesting, overall, dyadic view of bullying and cyberbullying.

Taken together, the findings provide support for the value of fostering positive relationships among peers in order to prevent bullying and cyberbullying. As a starting point and considering the findings from Chapter 7, social skills and peer relations could be emphasized through specific approaches, such as implementing social emotional learning (SEL) programs that consider emotional awareness and help students to manage their interpersonal situations effectively (Durlak et al., 2011). The development of such skills is essential for reducing the rate of victimization and developing positive peer relationships (Jenkins et al., 2018). Supportive peers, with whom one can open up, share opinions, and receive comfort in difficult circumstances, have a protective effect on well-being by making the student feel safe, protected, and welcomed(del-Rey-Alamillo et al., 2012).

As a second point, and based on the findings in Chapter 6, exclusively social-emotional learning interventions may not be enough since they do not directly address bullying and cyberbullying topics; therefore, students may still continue to be perceived these phenomena as dyadic. Consequently, interventions should include activities aimed at increasing awareness about the different roles involved in bullying and cyberbullying beyond the dyad bully-victim. It could be emphasized how joining the bully can fuel further harm to the victim by addressing activities that help to assume others' perspectives (such as role playing). In addition, it could be meaningful to highlight the defender's importance in stopping the aggressive behavior and provide bystanders with effective coping strategies to increase their empowerment and the possibility to intervene to help the victim (Guarini et al., 2019).

Finally, as it emerged from Chapter 7, it is crucial to work on the school climate, as more than just addressing issues faced in the classroom may be required. A student's understanding of safety and acceptance at school depends on the feeling of school

connectedness and how the whole school community perceives it (Simões et al., 2021). In turn, a positive school climate has been associated to reduced victimization and cybervictimization rates. To foster the school connectedness anti-bullying interventions that involve the wider community, including parents and students, are necessary (Prati et al., 2018).

8.5. Limits and Future research

The present dissertation focused on distance education and bullying and cyberbullying, and provided a comprehensive overview of risk and protective factors associated with ICT integration in school. However, in addition to the limitations of each study already reported in the relevant chapters, this dissertation presents a number of overall general limitations.

Firstly, it should be noted that the studies were conceived as two different lines of research in two different periods of time since studies on distance education were conducted during the first wave of COVID-19 (March-June 2020), while the studies on bullying and cyberbullying were conducted during the second wave of COVID-19 (October 2020-December 2021). In addition, data collection within the same line of research has been complex. Indeed, given the variable nature of the contagions due to the COVID-19, school buildings could suddenly be forced to close, making data collection impossible. Furthermore, even after the permanent opening of the schools, access by outsiders was generally forbidden or permitted only in exceptional cases, significantly limiting, therefore, the eye-tracker data collection.

Based on what has been said so far, it is, therefore not possible to identify a methodological continuum between the four empirical studies and the generalizability of their findings.

The second limitation consists in the cross-sectional approach for all the studies presented, which limits the possibility of empirically verifying causality between

predictors and research outcomes. Future research should consider investigating technology integration in schools across multiple time points to provide further support for the proposed sequence of effects.

Furthermore, all the studies presented so far are from Italian samples. In the future, it might be interesting to compare teachers and students from other countries, as the school system, attitudes, norms, and beliefs about schooling, as well as the level of technology within the school, can differ among the countries (Calvani, 2013; Giovannella et al., 2020).

In addition, the studies on distance education considered both positive and negative aspects, which was not done in the studies on cyberbullying. In the future, it would be interesting to run studies that also investigate the positive use that young people make of technologies, such as staying in touch with friends, meeting people with whom they can share interests and passions and keeping informed about what is happening in the world (Nesi et al., 2018). Finally, throughout this thesis, we have examined technology as an educational tool for teachers and a potentially harmful tool among peers, but we did not involve parents and families. In the future, we could also analyze technology as a connection tool between school and extra-scholastic contexts, such as families.

8.6 Conclusion

In the present technological world, digital environments are increasingly important for our daily lives, influencing numerous aspects of the school environment. The present dissertation has tried to enrich the existing literature and highlight how personal and contextual factors can affect the use of technology in school, both at educational and relational levels. In this context, research has the critical role of helping schools and policy to find a detailed, clear, and total vision of the many possibilities offered by the integration of ICT.

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