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Methodological issues in technology-mediated qualitative data collection: a mapping of research undertaken in schools during the Covid-19 pandemic

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Abstract

The Covid-19 pandemic strongly impacted most areas of human life, including research. Many of the studies in this period had to adapt to the limitations caused by the regulations and restrictions imposed as a result of the pandemic. Qualitative research occupies a relevant position in the field of educational research. The common feature of this type of research is the close relationship between researchers and participants. This element was called into question, with digital tools having emerged as a promising solution for data

collection. An intensification of the use of digital tools for data collection in qualitative research calls for a careful analysis and reflection concerning their strengths and weaknesses. The aim of this article is to analyse the methodological aspects of qualitative data collection through a systematic literature review, focusing on the use of digital tools in the context of educational studies during the pandemic. The main results highlight the increased significance of technology-mediated data collection in educational research post-Covid-19, with the USA leading in publications. Predominantly, current studies focus on teachers' perceptions and practices, underscoring the multifaceted nature of teaching. Interviews, often conducted via video calls or videoconferencing, were the most common data collection method. The transition from face-to-face to technology-mediated data collection in these studies shows the limited discussion of implications or ethical issues. This article provides insights into the use of technology-mediated tools, contributing to the advancement of methodological knowledge in times of crisis when the traditional use of qualitative data collection methods is compromised.

Keywords systematic mapping literature review; education; school education; qualitative research; educational studies; digital tools; technology-mediated data collection; Covid-19 pandemic

Introduction

Qualitative research has gained legitimacy in a wide range of scientific fields because it enables the description and interpretation of in-depth data (Liao et al., 2017), generating grounded theories of the social world (Glaser and Strauss, 2017). It operates in the world and in real situations; it is contextualized; it studies social processes; and it is holistic, inductive, flexible, analytical and systematic (Gayou-Jungerson, 2003). Qualitative research, which occupies a relevant position in the field of educational research (Hennink et al., 2020; Johnson and Christensen, 2014), through its assumptions, allows for the development of reasoned proposals, explanations of phenomena and informed decision-making for educational action, contributing to both theory and practice (McMillan and Schumacher, 2005).

Qualitative research can be conducted using different epistemological approaches (Doherty et al., 2015), and data collection can take place in different ways. The common feature of all approaches is the close relationship between the researcher and participants (Sousa et al., 2020). This element is called into question in times of crisis, be it the Covid-19 pandemic or natural disasters, conflicts and wars.

The effect of Covid-19 on (qualitative) research activities and practice

In January 2020, the Coronavirus disease was declared a public health emergency of international impact. On 5 May 2023, three years after its announcement, the World Health Organization declared the end of the Covid-19 pandemic. The pandemic had several negative consequences worldwide, not only restricting global economic growth, but also affecting various dimensions of human social life (Jain and Brockova, 2022). These three years also brought profound changes in research practices. In the context of qualitative research, which presumes the proximity between the researcher and the participants, data collection has been compromised due to the regulations and restrictions imposed as a result of the pandemic, with conducting face-to-face interaction with individuals and field studies being restricted indefinitely.

Digital tools in qualitative research

In this scenario, collecting qualitative data through digital tools has been seen as a promising solution (Dodds and Hess, 2021; Vindrola-Padros et al., 2020) in terms of overcoming physical, psychological and ethical challenges (Santana et al., 2021). Videoconferencing platforms, online audio/video calls, telephone or mobile phone calls, emails, online surveys and text chatting are some examples of digital tools used to collect qualitative data (Deslandes and Coutinho, 2020; Jain and Brockova, 2022; Sah et al., 2020).

While digital tools have been used since the 1990s, and the debate about their advantages and limitations was already present in the scientific literature (Thomas Dotta et al., 2019), with the Covid-19 pandemic, and the restrictive measures imposed on face-to-face interactions, their use was expanded (Nind et al., 2023). Despite the advantages, notably because of the possibility of 'making research happen' (Nind et al., 2023: 5) during the pandemic, several limitations were identified, especially when transposing traditional methods to virtual environments. In the context of the relationship between researcher and participant(s), crucial elements of qualitative data collection constraints include difficulties in reading body language and facial expressions (Deslandes and Coutinho, 2020; Pocock et al., 2021), barriers to building trust (Kobakhidze et al., 2021; Walker et al., 2021; Webber-Ritchey et al., 2021) and much shorter and less contextual responses from participants (Davies et al., 2020). Concerning access to and from participants, the use of a videoconference platform could exclude those with little or no access to technology (Chatha and Bretz, 2020; Dodds and Hess, 2021; Melis et al., 2021), exacerbating issues such as representational justice (Kobakhidze et al., 2021; Otto and Haase, 2022; Wa-Mbaleka and Costa, 2020) and the under-inclusion (Gilmore-Bykovskiy et al., 2021) of vulnerable people and groups. In the field of ethical issues, weaknesses have also been identified, including the difficulty of protecting confidentiality through virtual connections (Kobakhidze et al., 2021; Rahman et al., 2021), obtaining the free and informed consent of vulnerable populations, and knowing whether compensation is merely an incentive or potentially coercive (Santana et al., 2021).

The constraints on data collection with digital tools mentioned in studies undertaken during the Covid-19 pandemic are the same as those identified in studies carried out before the pandemic (Aborisade, 2013; Bampton and Cowton, 2002; Hamilton and Bowers, 2006; James, 2007; Thomas Dotta et al., 2019). The increased risks in times of crisis and emergency are linked to the adoption of quick fixes, which are not subject to a process of evaluation, critical discussion and grounding in studies that have already been carried out. For Nind et al. (2023), it is not sustainable for a researcher to find their way into research without a foundation in evidence based on existing knowledge. The authors consider that it is essential to consult analyses of emerging and tested methodological adaptations, even though they know that the method must be adapted to each situation in all cases. Therefore, the influence of the data collection method and its possible constraints must be taken into account in the analysis and interpretation process. However, researchers must communicate their findings transparently and prove how data collection mediated by digital tools has impacted the analysis, interpretation and dissemination of their results (Pocock et al., 2021).

In addition to the potential and limitations of data collection mediated through digital tools that can be found in the literature, it is worth highlighting expressive and creative forms of research that have been adapted to the context of the Covid-19 pandemic and the resources available, including letter writing (Maycock, 2021), diary writing (Scott et al., 2021), digital narratives (Malachowska et al., 2021), photographs and drawings (Isaacs et al., 2021) and other arts-based methods (Green et al., 2022). These methods, as well as not requiring significant adjustments to the pandemic, have promoted expression in any form available to communicate lived experiences (Nind et al., 2023).

The context of formal education (particularly preschool and K–12 schools, as well as higher education) as a topic of study, as a context for scientific intervention or as a target population for research (teachers, principals, students and parents, for example) was strongly impacted by this period of crisis, mainly due to the characteristics of the established types of participation in the constitution of qualitative research in education (Matos et al., 2023). According to Matos et al. (2023), higher education, as the context mainly responsible for promoting and developing research, currently recognises the major challenges for research being carried out in preschool and K–12 schools, highlighting the need to reconsider the ongoing types of research culture that are being undertaken.

During the Covid-19 pandemic, as already mentioned, strict restrictions were imposed, especially in the methodological area, which required the implementation and adaptation of strategies to ensure the

continuity of scientific research. Literature reviews aimed at consolidating and systematising the available evidence, specifically in relation to qualitative data collection, can serve as a basis for understanding how a variety of methods can be used and adapted to contexts of physical distancing, as well as providing explanations of the challenges associated with their use (Hall et al., 2021).

Cretu and Ho (2023) conducted a bibliometric analysis of the impact of the Covid-19 pandemic on educational research, focusing on publications during 2020 and 2021. Their findings revealed a concentration of studies in chemical and medical education, predominantly from the USA, emphasising online learning, curricular approaches and the psychological effects of the pandemic on education. Other reviews examined the effects of the pandemic on education (Altinsoy and Boyraz, 2022; Sánchez Amate et al., 2021) and of remote teaching in higher education (Sum and Oancea, 2022). Ruiz-Real et al. (2020) found that health-related studies dominated Covid-19 research, with social sciences, particularly education, focusing on online education. Roychowdhury et al. (2022) highlighted themes such as psychosocial issues and economic concerns, identifying the USA as a central hub. No systematic reviews on qualitative data collection in school education were found.

Considering this background, we sought to conduct a systematic mapping (James et al., 2016; Newman and Gough, 2020) of studies conducted in schools during the Covid-19 pandemic that used digital tools for qualitative data collection. Our findings identified key themes within these empirical studies and problematised the transition from traditional face-to-face to online data collection processes. We aimed to provide insights into the use of these tools, contributing to the advancement of knowledge in the methodological domain during periods of crisis affecting the traditional use of qualitative data collection methods.

Methodology: systematic mapping study design

Systematic mapping provides an overview of a particular research topic (Haddaway et al., 2016), identifies the gaps and knowledge clusters and characterises the methodological designs (James et al., 2016; Newman and Gough, 2020). In a systematic mapping study in social sciences such as this one, critical appraisal of individual sources of evidence (to judge the trustworthiness of the studies) is optional. Given the objectives of this study, which involved analysing broader topics within studies undertaken in K–12 school contexts, the inclusion of a critical appraisal of individual sources of evidence is not applicable (Haddaway et al., 2016). The coding scheme for systematising results was designed to characterise studies on the use of digital tools in the collection of qualitative data in studies conducted during the Covid-19 pandemic focusing on schools. It was based on the assumptions of thematic analysis (Vaismoradi et al., 2013).

Objective and research questions

Systematic mapping seeks to identify and classify primary studies in a specific subject area, including research questions that are answered by searching for, identifying and extracting data, coded into specific categories. Therefore, in this study we aimed to conduct a systematic mapping of studies conducted in schools during the Covid-19 pandemic, which use digital tools for collecting qualitative data. Associated with this central objective, we also sought to identify central themes, and the temporal and geographical trends, of the selected publications. These objectives are materialised in the following Research Questions (RQ), corresponding to the objectives of this study:

RQ1: What were the trends in the identified publications in terms of time and geography?

RQ2: What were the main themes of empirical studies carried out in schools using data collection methods mediated by digital tools?

RQ3: What digitally mediated data collection methods were used, who were the subjects/participants and what were the data analyses used in these studies?

RQ4: How is the change from face-to-face qualitative data collection to data collection mediated by digital tools discussed by the authors of the studies analysed?

Eligibility criteria

To define the eligibility criteria, and to begin the identification and selection of articles, we worked independently (and afterwards as a group) in reading the titles and/or abstracts, and inductively considered for inclusion: (1) empirical studies; using (2) qualitative methods or (3) mixed methods; and (4) carried out in elementary and secondary schools.

The following first set of exclusion criteria were defined: #1: higher education studies; #2: preschool studies; #3: studies that focused on health, medicine and other fields/professions, or focused on a specific topic unrelated to education; #4: studies that used only quantitative methodologies, literature reviews or meta-analysis studies; #5: theoretical or methodological studies. The second set of exclusion criteria were defined: ##1: studies in which data were collected before the Covid-19 pandemic (before March 2020); ##2: studies in which the data collection period was not specified; ##3: studies with no clear indication of whether data were collected online or in person; ##4: studies with in-person data collection; ##5: articles that could not be accessed.

Identification of databases and search terms

The identification of the studies was conducted using the Scopus and Web of Science (WoS) databases. Without disregarding possible limitations, with consequences such as the exclusion of other valuable articles, the choice of databases is justified because these are established and internationally indexed databases with peer-reviewed journal articles, and they are considered to be the most comprehensive data sources for various purposes (Pranckutė, 2021). In addition, these databases offer advanced search and filtering options, and they are considered suitable tools for synthesising evidence in the form of systematic reviews (Martín-Martín et al., 2021). These options make it possible to articulate and formulate a query in a systematic search context, paying particular attention to a high degree of coverage, recall, precision and reproducibility (Gusenbauer and Haddaway, 2020).

In March 2023, we defined which methodological approach to take, namely the definition of keywords and the search query in the title and/or abstract (Table 1). For keywords that would specifically lead to the methodological dimension intended to be explored, a larger number of tests were carried out. We did not want to risk excluding any type of data collection technique (for example, specific words such as ‘interviews’ and ‘focus groups’). Therefore, broader terms were chosen (qualitative methodologies OR qualitative research), and only studies that mediated their use with digital tools, regardless of the data collection techniques used, were included.

Table 1. Definition of keywords and search query

Type	Search query
(i)	education * OR school
(ii)	pandemic context OR during Covid-19 OR during pandemic OR during SARS-CoV-2 OR during coronavirus
(iii)	qualitative methodologies OR qualitative research
(iv)	query (i) AND query (ii) AND query (iii)

We looked for articles in English, Portuguese and Spanish, since we are proficient in these languages; however, the search was conducted using English keywords. In general, articles published in peer-reviewed journals have abstracts and keywords in English, regardless of the main language of the article, so this did not compromise the search, and guaranteed that we obtained to the same results.

The identification of the studies in the Scopus and WoS was conducted on 31 July 2023. The filters applied in the two databases were: (1) type of document: peer-reviewed scientific articles; (2) date of publication: 2020–3 (this time span is related to the period identified as the Covid-19 pandemic context; (3) language: English, Spanish and Portuguese (due to the substantial nature of Anglo-Saxon scientific

production and the language skills of the researchers); (4) subject area: social sciences (in the Scopus database) and education (in the WoS database).

Intercoder reliability

To mitigate the risk of bias in the realisation of this study, we divided the work among us during the different phases of designing the search strategy, selecting information sources, setting eligibility criteria, and in the data collection selection process. Subsequently, we analysed agreements and disagreements, and final decisions were reached through consensus. The intercoder reliability, calculated in terms of percentage agreement, exceeded 87 per cent. Two specific software tools, EndNote and NVivo, were critically employed. Notably, there were no technological errors recorded during this process. The use of these software programs was efficient, resulting in effective outcomes.

Data analysis and synthesis

The selected articles were exported to the NVivo software. The features of NVivo allowed for the automatic classification of articles by year of publication. Subsequently, they were classified according to the country in which the study was conducted. This procedure made it possible to respond to RQ1. Thematic analysis (Vaismoradi et al., 2013) was used to identify the main themes addressed in the articles. This process followed several steps: (1) engagement with the data; (2) initial coding; (3) themes identification; (4) review of themes; (5) themes definition; and (6) final data analysis. Through thematic analysis of the articles, it was possible to address RQ2. The in-depth reading of the methodological dimensions of the studies led to their classification in terms of methodological approach, participants, data collection instruments, type of technological tool used and data analysis. The classification of methodological dimensions referred to the explicit indications of the authors of the articles regarding the defined categories. This final step addresses RQ3 and RQ4.

Results of the systematic mapping study: data extraction and selection of articles

The initial screening yielded 1,169 articles identified in the Scopus database ($n = 117$) and the WoS database ($n = 1,052$). The selected articles were exported to EndNote, where duplicate articles ($n = 11$) were excluded, and 1,158 articles were submitted to a new selection stage.

The application of the first set of inclusion/exclusion criteria resulted in the excluded articles: #1 ($n = 516$); #2 ($n = 17$); #3 ($n = 182$); #4 ($n = 8$); #5 ($n = 115$). At this stage, 838 articles were excluded. The final screening was based on the remaining 320 articles, which were reanalysed. These 320 articles were distributed among the authors and subjected to the second set of inclusion/exclusion criteria. The following were excluded from the analysis: ##1 ($n = 100$); ##2 ($n = 92$); ##3 ($n = 26$); ##4 ($n = 42$); ##5 ($n = 21$). In this process, 39 articles were kept for final analysis, which are shown in Table 2. A more in-depth reading of the 39 articles made it possible to code them according to the year of publication, the country of origin of the study, the central theme and the methodology used. The process of identification, screening and inclusion of the articles in the review is illustrated in Figure 1.

Table 2. The 39 articles used in the final analysis

Author(s)	Date	Title
Abejuela et al.	2023	'Assessment of the reading curriculum in basic education in the Philippines context'
Altun and Bulut	2021	'The roles and responsibilities of school administrators during the emergency remote teaching process in Covid-19 pandemic'

Table 2. Cont.

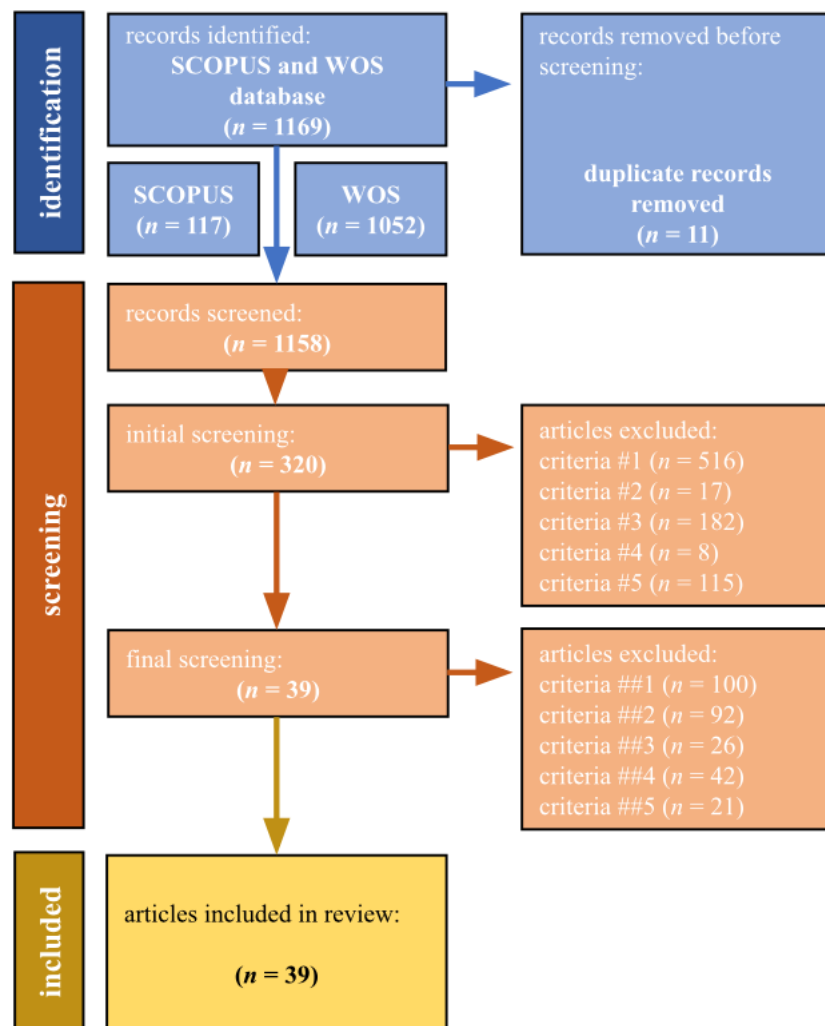
Author(s)	Date	Title
Aydin-Gunbatar et al.	2023	'The integrations of elementary science teachers' technological pedagogical content knowledge components during COVID-19: Teaching electric circuits and circuit diagrams'
Bentley	2022	'A snapshot of science education during Covid-19 in the spring of 2021'
Berbain et al.	2023	'The impact of mentoring on English language teachers: A case from Argentina'
Biber et al.	2022	'Teachers' perceptions on technology-assisted mathematics teaching and the interactive activities'
Bjorklund	2023	'"I kind of have that place to sit": First-year teachers' experiences of belonging'
Brinia et al.	2023	'Attitudes and perceptions of school principals about the contribution of evaluation to the efficient operation of schools both at the administrative and educational levels'
Burgin et al.	2023	'Culturally responsive schooling during Covid-19: A study of six elementary level educators' reality'
Carro-Olvera and Sánchez-Olavarría	2022	'Distance basic education in Covid-19 time from the analysis of the "Aprende en Casa" strategy in Tlaxcala, Mexico'
Cole et al.	2023	'The emergence of teacher self in the elementary classroom'
Coulter et al.	2023	'PE at home: Keeping the 'E' in PE while home-schooling during a pandemic'
Cruz et al.	2023	'Understanding the meaning of a digital school from the perspective of primary school teachers'
Da'as et al.	2023	'Crisis leadership: Principals' metaphors during COVID-19'
De Oliveira and Correa	2020	'Portuguese language teaching with mediation of digital technologies in pandemic times'
Dempsey and Mestry	2023	'Teachers' perceptions and experiences of navigating continuing professional development during the Covid-19 pandemic'
Francois	2023	'"Our teaching transcends a subject matter": Learning from Black women educators' beliefs about literacy instruction during extraordinary times'
Furuta et al.	2022	'Public elementary school teachers' positioning in teaching physical education to Japanese language learners'
Güvercin et al.	2022	'Distance education experiences of teacher-parents during the Covid-19'
Jakavonyte-Staskuviene and Barkauskiene	2023	'Transformative teacher leadership experiences in schools in creating an innovative educational culture: The case of Lithuania'
Jang et al.	2022	'Practical early prediction of students' performance using machine learning and eXplainable AI'
Kaul et al.	2022	'Leading from the middle: How principals rely on district guidance and organizational conditions in times of crisis'

Table 2. Cont.

Author(s)	Date	Title
Keese et al.	2022	'Teaching through crisis: The remote education experiences of PK–12 teachers during Covid-19 campus closures'
Kirshner	2023	'Disruption, transformation, resilience, and hope: The experience of a Belizean community during Covid-19 lockdown'
Lepp et al.	2021	'Teaching during COVID-19: The decisions made in teaching'
Lin et al.	2023	'“Not try to save them or ask them to breathe through their oppression”: Educator perceptions and the need for a human-centered, liberatory approach to social and emotional learning'
Matiki et al.	2023	'A comparison of teacher's involvement in curriculum development in developing and developed countries: A case study of Namibia'
McHenry-Sorber et al.	2023	'“If I ever leave, I have a list of people that are going with me”: Principals' understandings of and responses to place influences on teacher staffing in West Virginia'
Montiel-Ruiz et al.	2023	'Social networks and gamification in physical education: A case study'
Morrison and Hughes	2023	'Making the shift to virtual professional learning'
Ntuli et al.	2023	'Partnership to promote school governance and academic experience: Integration of remote learning in the context of the COVID-19 pandemic in the Mkhanyakude district'
Raak et al.	2021	'Exploring the perceptions of Estonian teachers' data use in school development'
Rahayu et al.	2022	'Teaching with technology during COVID-19 pandemic: An interview study with teachers in Indonesia'
Reis and Schwertner	2021	'Learning in environmental education in the school context: Understanding elementary school students'
Shamir-Inbal and Blau	2021	'Facilitating emergency remote K–12 teaching in computing-enhanced virtual learning environments during COVID-19 pandemic: Blessing or curse?'
Shi et al.	2021	'Investigating relationships among blended synchronous learning environments, students' motivation, and cognitive engagement: A mixed methods study'
Simó-Pinatella et al.	2022	'Special education teachers' experiences of addressing challenging behaviour during the pandemic'
Tafazoli and Meihami	2023	'Narrative inquiry for CALL teacher preparation programs amidst the COVID-19 pandemic: Language teachers' technological needs and suggestions'
Yuksekk and Unsal	2023	'Being prepared and preparing the students for the central exam with distance education'

The main findings of this research are organised to provide answers to the four research questions. Accordingly, for a better understanding of the results, the following four sections are related to each of the research questions.

Figure 1. Flow diagram of the extraction of articles through database searches



Time and geography contextualisation

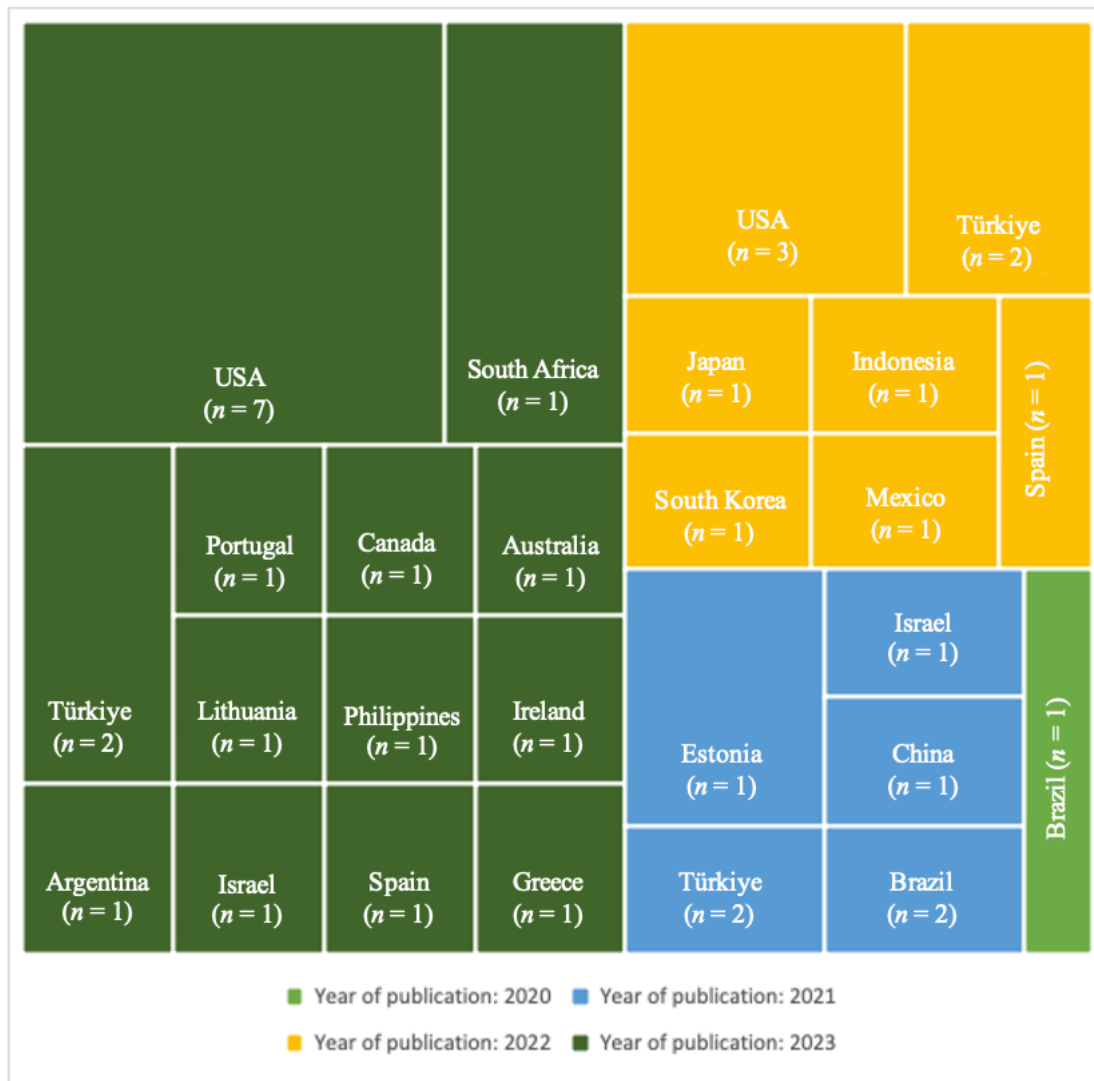
The time span of the articles is 2020–3. The highest number of publications is concentrated in the years 2022 and 2023. This time distribution is related to the development of the Covid-19 pandemic itself and to the constraints to which publication processes are subject.

In terms of context, the 39 studies come from 20 countries: Argentina ($n = 1$), Australia ($n = 1$), Brazil ($n = 2$), Canada ($n = 1$), China ($n = 1$), Estonia ($n = 2$), Greece ($n = 1$), Indonesia ($n = 1$), Ireland ($n = 1$), Israel ($n = 2$), Japan ($n = 1$), Lithuania ($n = 1$), Mexico ($n = 1$), Philippines ($n = 1$), Portugal ($n = 1$), South Africa ($n = 3$), South Korea ($n = 1$), Spain ($n = 2$), Türkiye ($n = 5$) and the USA ($n = 10$). Figure 2 shows the relationship between the year of publication and the countries where the studies were undertaken.

Main themes

The analysis of the articles allowed the identification of four research themes: (1) perceptions and practices of teachers and other educators ($n = 22$); (2) impact analysis of educational projects ($n = 6$); (3) perceptions and practices of school coordinators ($n = 5$); and (4) teachers' identities and professional development ($n = 6$).

Figure 2. Relationship between the year of publication and the countries where the studies were undertaken



Theme 1: perceptions and practices of teachers and other educators

The 22 studies on the perceptions and practices of teachers and other educators deal with different questions. Abejuela et al. (2023) and Matiki et al. (2023) focus on curriculum interpretation and involvement. Güvercin et al.'s (2022) study is based on the perceptions of parents and teachers regarding distance learning during the Covid-19 pandemic. Kirshner's (2023) study focuses on the resilience of the educational community. Lin et al. (2023), Biber et al. (2022), Furuta et al. (2022), Montiel-Ruiz et al. (2023) and Simó-Pinatella et al. (2022) address perceptions and practices related to specific pedagogical approaches. Perceptions and practices related to the use of educational big data by teachers in schools are discussed by Raak et al. (2021). Jang et al. (2022) discuss the potential of using technological resources to identify vulnerable students. Reis and Schwertner (2021) and Shi et al. (2021) focus their studies on the effects of teachers' practices on student learning. The challenges faced by teachers during the pandemic were addressed in the majority of articles (Aydin-Gunbatar et al., 2023; Bentley, 2022; Burgin et al., 2023; De Oliveira and Correa, 2020; Keese et al., 2022; Lepp et al., 2021; Rahayu et al., 2022; Shamir-Inbal and Blau, 2021; Tafazoli and Meihami, 2023). Within this topic, studies focusing on pandemic issues predominate ($n = 13$).

Theme 2: impact analysis of educational projects

The impact analysis of educational projects was the focus of six studies. Carro-Olvera and Sánchez-Olavarría (2022) detail an educational programme developed by the government known as *Aprende en casa*. Coulter et al. (2023) analyse the impact of an educational resource in the field of physical education teaching. Kaul et al. (2022) focus on the implementation of external guidelines and their management within a school context. These first three articles are related to the implications of the pandemic. Berbain et al. (2023) discuss the effects of a mentoring project for experienced teachers; Cruz et al. (2023) address the 'digital school' project from the perspective of teachers; and Yuksek and Unsal (2023) discuss a distance programme for examination preparation.

Theme 3: perceptions and practices of school coordinators

Regarding the theme of perceptions and practices of school coordinators, Altun and Bulut (2021), Da'as et al. (2023) and Ntuli et al. (2023) address the roles and responsibilities of principals during the pandemic. Brinia et al. (2023) explore principals' perceptions of teacher evaluation processes in the Greek context, and McHenry-Sorber et al. (2023) explore the role of principals in teacher recruitment. It is worth noting that the latter two articles are not directly related to the Covid-19 pandemic.

Theme 4: teachers' identities and professional development

The studies conducted by Cole et al. (2023) and Jakavonytė-Staškuvienė and Barkauskienė (2023) delve into teacher identities. Also related to the study of identities are the study by Francois (2023), which discusses the beliefs of Black teachers and their educational role during the Covid-19 pandemic period, and the study by Bjorklund (2023), which explores the sense of belonging to the profession among novice teachers. Dempsey and Mestry (2023), as well as Morrison and Hughes (2023), discuss the possibilities and requirements of professional development during the pandemic. Figure 3 illustrates the relationship between the themes of the articles, the context in which the studies were undertaken and the year of publication.

Methodologies, data collection and study participants

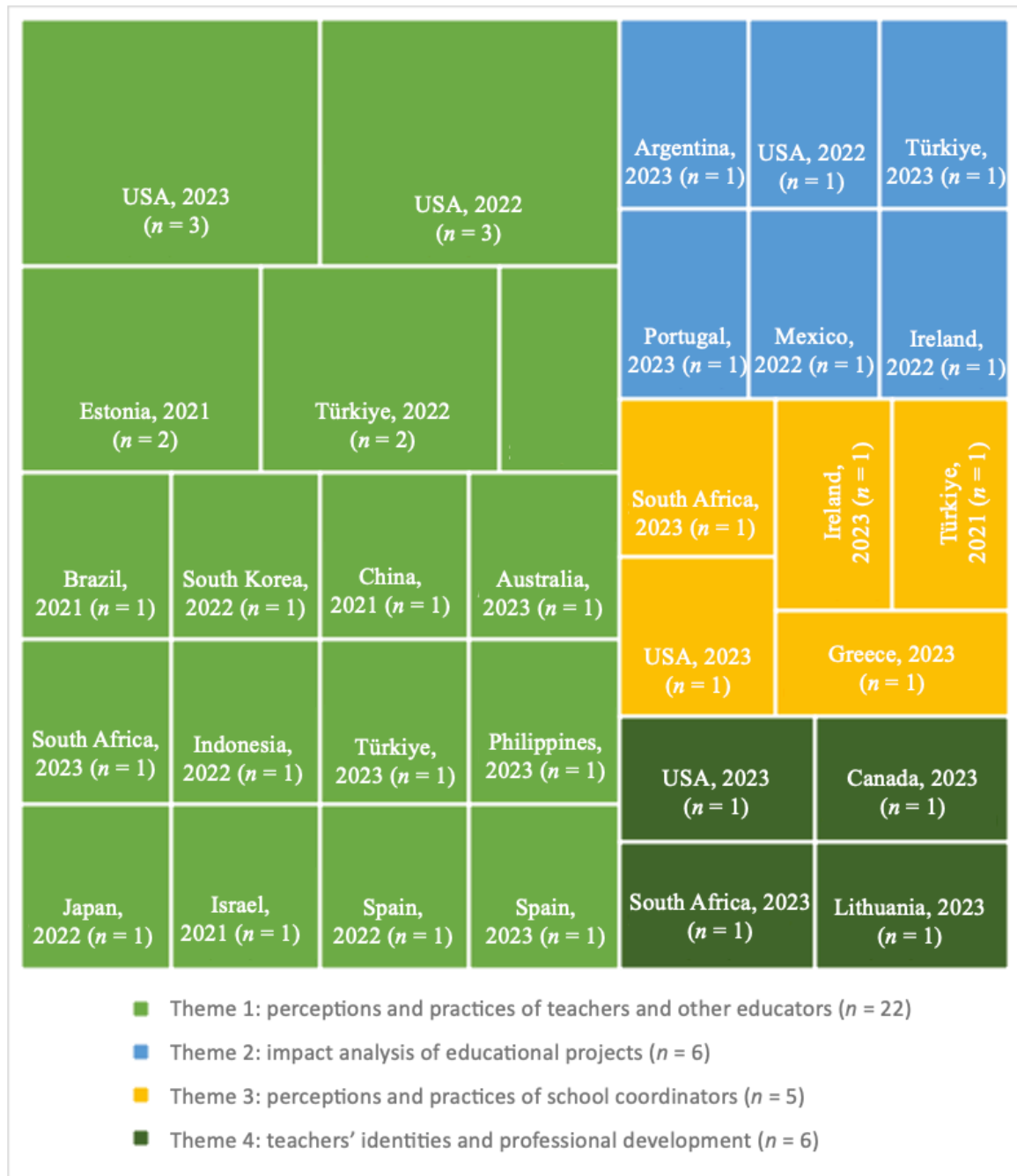
Although the primary focus of this study lies in qualitative research, mixed-methods studies were included in the selection whenever their qualitative dimension involved technology-mediated data collection. Therefore, two articles present mixed-methods studies (Coulter et al., 2023; Shi et al., 2021), while the others are qualitative studies. The studies where the methodological approach is specified by the authors are case studies (Altun and Bulut, 2021; Biber et al., 2022; Burgin et al., 2023; Da'as et al., 2023; Güvercin et al., 2022; Ntuli et al., 2023) and multiple case studies (Bjorklund, 2023), exploratory studies (Bentley, 2022; Berbain et al., 2023; Carro-Olvera and Sánchez-Olavarría, 2022; Cole et al., 2023; De Oliveira and Correa, 2020; Furuta et al., 2022; Jang et al., 2022), biographical-narrative study (Tafazoli and Meihami, 2023) and phenomenological study (Raak et al., 2021). In the remaining articles, the authors only identify the studies as qualitative.

Regarding the type of participants in the studies, they are teachers, principals, students, parents and other educators (Table 3). Teachers constitute the majority of participants ($n = 28$), and are exclusive participants in 21 studies. School principals or management members participate in 9 studies, being exclusive in 5 studies. Students participate in 4 studies, being the sole participants in 3 studies. Parents participate in 3 studies.

As far as data collection is concerned, the studies analysed predominantly used interviews ($n = 29$), either exclusively or in conjunction with another data collection instrument. Some studies employed more than one technique, incorporating focus groups, open-ended question surveys, narrative writing and observation. These data collection techniques were implemented in a virtual environment or via digital tools. In the case of Brinia et al.'s (2023) study, face-to-face interviews and online interviews were conducted; Kaul et al. (2022) conducted interviews by telephone, while Rahayu et al. (2022) used the WhatsApp app. However, the predominant method involved some type of videoconferencing platform, such as Google Meet and Zoom. Although many studies used multiple data collection instruments in a complementary manner, considering the aim of this review, we give greater prominence

to technology-mediated instruments. Table 4 demonstrates the general scenario of the data collection techniques, and the digital tools employed across various studies.

Figure 3. Relationship between the themes of the articles, context and year of publication



Regarding data analysis, most studies employ only one research analysis approach. Authors predominantly indicate the use of content analysis (n = 16) and thematic content analysis (n = 13). Other types of analysis are also indicated by the authors, as can be seen in Table 5.

About technology-mediated data collection

Most of the studies analysed used individual and/or group interviews as data collection techniques, using videoconference platforms (such as Zoom and Google Meet) ($n = 33$), telephone ($n = 2$) and WhatsApp video calls ($n = 3$).

Table 3. Type of participants in the studies

Type of participants	Number of studies
Educators (for example, teachers, principals, school supervisors)	1
Principals	5
Principals, parents	1
Principals, teachers, pupils/students, parents	1
School supervisors	1
Students	3
Teachers	21
Teachers, parents	2
Teachers, principals	1
Teachers, students	2
Teachers who are parents	1

Table 4. Data collection techniques and digital tools

Data collection	Technological tool
Interview	Online platform ($n = 15$)
	Google Forms ($n = 2$)
	WhatsApp videocall ($n = 1$)
	Phone call ($n = 1$)
	Phone call, online platform ($n = 1$)
	WhatsApp videocall, online platform ($n = 1$)
Interview, focus group	Online platform ($n = 4$)
	WhatsApp videocall, online platform ($n = 1$)
Survey – open-ended questions	Online platform ($n = 4$)
Focus group	Online platform ($n = 3$)
Written narratives	Written texts ($n = 1$)
Interview, survey – open-ended questions	Online platform ($n = 1$)
	Online platform, Google Forms ($n = 1$)
Observation	Online platform ($n = 1$)

Table 5. Data analysis and studies

Data analysis	Number of studies
Content analysis	17
Thematic analysis	13
Grounded theory	2
Constant comparative analysis	1
Correlation analysis	1
Narrative analysis	1
Discursive textual analysis	1
Without information	2

Among the 39 studies analysed, 15 studies make reference to technology-mediated data collection, reflecting on its strengths and weaknesses. Within these 15 studies, some are limited to mentioning that data collection occurred during the Covid-19 pandemic period, with constraints such as the need for physical distancing determining the form of data collection (Altun and Bulut, 2021; Bjorklund, 2023; Furuta et al., 2022; Lepp et al., 2021; Matiki et al., 2023). The impossibility of conducting face-to-face data collection is also acknowledged as a limitation in some studies. For Aydin-Gunbatar et al. (2023), virtual interviews may limit the depth of participants' reflection due to teachers' fatigue from excessive virtual meetings during the Covid-19 pandemic. Bentley (2022) indicates as a limitation the impossibility of greater involvement with the context. Participant recruitment limitations were mentioned in Kaul et al.'s (2022) article, as participant selection was restricted to the investigators' connections.

Cole et al. (2023), Brinia et al. (2023) and Simó-Pinatella et al. (2022) acknowledge limitations associated with technology-mediated data collection without specifying them, mentioning mitigation measures such as promoting open and positive communication, and creating a welcoming environment. Kirshner (2023) and Reis and Schwertner (2021) mention familiarity with using this type of platform as a factor contributing to the success of online interviews, and the mitigation of any limitations.

Coulter et al. (2023) argue that online interviews produce similar results to face-to-face interviews, an argument that the authors base on the study by Kite and Phongsavan (2017). Rahayu et al. (2022) also advocate for online interviews as a viable alternative to avoid physical obstacles.

For studies involving other data collection techniques, such as open questions in online questionnaires (Cruz et al., 2023; Güvercin et al., 2022; Lin et al., 2023; Shamir-Inbal and Blau, 2021; Shi et al., 2021; Yuksek and Unsal, 2023), narrative writing (Tafazoli and Meihami, 2023) and autobiography (De Oliveira and Correa, 2020), there is no indication that the choice was due to the implications of the Covid-19 pandemic, because these are already well-established techniques in qualitative research (Creswell, 2011). The study by Carro-Olvera and Sánchez-Olavarría (2022) analysed interactions in a virtual environment, where supervisors organised an emotional well-being and health strategy in distance learning, making the virtual environment the context, not the data collection tool.

In other studies where interviews and/or focus groups were undertaken (Abejuela et al., 2023; Berbain et al., 2023; Biber et al., 2022; Burgin et al., 2023; Da'as et al., 2023; Dempsey and Mestry, 2023; Francois, 2023; Jakavonytė-Staškuvienė and Barkauskienė, 2023; Jang et al., 2022; Keese et al., 2022; McHenry-Sorber et al., 2023; Montiel-Ruiz et al., 2023; Morrison and Hughes, 2023; Ntuli et al., 2023; Raak et al., 2021), no mention was made of the dynamics and/or implications of using digital communication platforms.

Discussion and conclusions

The Covid-19 pandemic disrupted the usual practices of scientific research, especially data collection. Qualitative research, which relies on methods involving interactions with groups of people, has been strongly affected too (APA, 2020). Nonetheless, the attributes of qualitative research offer the potential to thoroughly explore the implications of unprecedented situations such as the pandemic, as well as other

crises that disrupt and influence entire societies (Santana et al., 2021). The need to continue research amid the threat of Covid-19, as well as the potential of qualitative research in this context, has required qualitative researchers to adapt traditional approaches and explore alternative data collection methods. However, the urgent nature of the situation, that is, the need to find quick solutions, poses the risk of compromising data reliability, academic integrity and credibility (Otto and Haase, 2022; Torrentira, 2020). In this sense, further reflection on adaptations and/or the development of new data collection methods within qualitative research resulting from the pandemic period could be extremely beneficial for consolidating and/or revising the procedures used and their application in similar crisis situations (Wa-Mbaleka and Costa, 2020). With the aim of identifying and characterising studies conducted during the pandemic within a school setting that used qualitative data collection methods mediated by digital tools, this mapping took into account four research questions that will guide subsequent discussion and analysis.

RQ1: Time and geography contextualisation

The discussion and reflection on the object of this study – technology-mediated data collection – gained increased significance during the Covid-19 pandemic period (Torrentira, 2020), justifying the established temporal scope for this literature mapping from 2020 to 2023. The observed growth from 2021 onwards, and the greater concentration of publications in 2023, align with the general trend of publications in the field of education, particularly focusing on the Covid-19 pandemic (Cretu and Ho, 2023). On this topic, the concentration of publications in 2023 may suggest a maturation of this educational issue in accordance with the ‘initial chaos’ and adaptation period of the early pandemic years. On the one hand, this maturation phase could reflect a more systematic and rigorous approach to technology-mediated data collection in education. On the other hand, the concentration of studies in 2023 could also be attributed to the inherent process of conducting research and the dynamics of publication. Research projects initiated during the early pandemic years would have reached completion and publication stages by 2023, resulting in a higher volume of published studies. Geographically, the predominance of publications from the USA is notable. This trend is consistent with findings from broader bibliometric studies, which also highlight the USA as a central hub for educational research during the pandemic (Cretu and Ho, 2023; Roychowdhury et al., 2022). The USA’s leading role in this context may be influenced by several factors, including the country’s extensive research infrastructure. However, this dominance raises critical questions about the diversity and representativeness of the research (Gilmire-Bykovskiy et al., 2021). Beyond financial constraints, infrastructural limitations and language barriers, several factors critically shape the global distribution and representation of educational research and the wider research landscape. These factors include access to technology and data, educational policies and priorities, academic and publishing cultures, sociopolitical stability, and training and development opportunities for researchers. Ensuring that educational innovations and insights from various contexts are recognised and integrated globally is essential for advancing educational practices and policies worldwide.

RQ2: Central themes

Most of the analysed articles focus on the Covid-19 pandemic, which aligns with the general research trend (Cretu and Ho, 2023). The multifaceted nature of the teaching profession (Abejuela et al., 2023), particularly in terms of pedagogical practices and students’ learning processes, was further challenged by the implications of the pandemic (Shamir-Inbal and Blau, 2021). Intrinsic to the pedagogical dimension implied in remote teaching is the relational and socio-emotional dimension. Physical distancing posed significant challenges in this regard, affecting both students and teachers (Keese et al., 2022; Kirshner, 2023). These dimensions are central to the analysed studies on perceptions and practices of teachers and other educators.

The Covid-19 pandemic forced an unprecedented educational shift, demanding teachers’ emergency decision making influenced by external factors and by their digital competencies (Altun and Bulut, 2021; Lepp et al., 2021). The analysed literature reveals a nuanced interplay between the urgent adaptation to remote learning and the ongoing commitment to educational objectives. The focus on maintaining student well-being, socialisation and motivation emerged as a crucial but challenging priority during school closures (Rahayu et al., 2022). Studies indicate that while teachers endeavoured to preserve the curricular work, the emotional and psychological needs of students often took precedence,

reflecting a significant effort towards more empathetic educational practices. This equilibrium between emotional support and academic concerns underscores a significant shift in pedagogical priorities, demonstrating that students' emotional well-being is not merely complementary to, but a fundamental component of, educational success (Burgin et al., 2023).

Furthermore, the pandemic underscored the transformative potential of digital tools to sustain educational delivery and to innovate it (Biber et al., 2022; Carro-Olvera and Sánchez-Olavarría, 2022; Tafazoli and Meihami, 2023). The swift adoption of digital technologies presented a paradox: while it created unparalleled opportunities for advancing learning, it also laid bare significant disparities in access and engagement. In special education, these challenges were magnified, driving innovations in digital accommodations (Coulter et al., 2023; Simó-Pinatella et al., 2022). However, this situation also accentuated the urgent need for more comprehensive support systems to foster truly inclusive education.

The resilience of the educational community has stood out as a cornerstone of the pandemic response. Teachers, students, parents and institutional leaders have demonstrated adaptability and perseverance, which were essential in navigating the complexities of the sudden transition to online formats (Bentley, 2022; Kirshner, 2023). This resilience, however, must be understood in a broader context of preparedness and support (Da'as et al., 2023). The experiences of the pandemic provide critical lessons for developing sustainable and flexible educational practices that are resilient not only in pandemic times, but also during any large-scale disruptions (Shamir-Inbal and Blau, 2021).

Professional development and professional identities, a theme encompassing some of the articles analysed, highlights the importance of collaborative work and teacher agency. Collaborative environments not only facilitate the exchange of knowledge and experiences, but also increase pedagogical effectiveness and the development of the necessary digital competencies (Dempsey and Mestry, 2023; Morrison and Hughes, 2023). These collaborative frameworks are essential, as they allow educators to continually reflect on and adapt their pedagogical practices, which is crucial for the evolution of their professional identities. Recognising the complexity of individual trajectories and contextual influences allows for interventions that are more aligned with teachers' real needs (Cole et al., 2023; Jakavonytė-Staškuvienė and Barkauskienė, 2023). This in-depth understanding ensures that professional development initiatives are formative and transformative, promoting a significant evolution, both in teachers' identities and in their practices.

The Covid-19 pandemic has highlighted and exacerbated multiple and profound educational inequalities worldwide (Beaunoyer et al., 2020). School closures and distance learning have impacted student learning (OECD, 2022), especially among the most vulnerable groups (socially and academically). However, among the analysed studies, this crucial theme is under-represented, with only Kirshner's (2023) study addressing it comprehensively. This underscores the need for more focused educational research on how such disruptions disproportionately affect vulnerable groups, and the importance of understanding and supporting their resilience. Conversely, within this same theme, most studies not directly related to the Covid-19 pandemic focus on the relationship between pedagogical practices and the use of digital technologies. This trend is aligned with the growing demand for the integration of digital technologies in education, which predates the pandemic period, and which has been widely discussed in the educational literature (Timotheou et al., 2023).

RQ3: Technology-mediated data collection, participants and data analyses

The majority of the analysed studies reported using interviews ($n = 32$), conducted individually and/or in groups, either exclusively and/or associated with other forms of data collection, typically video calls or videoconferencing. Despite some analysed articles suggesting that the Covid-19 pandemic presented an opportune moment for the development of new and creative qualitative data collection strategies (Jain and Brockova, 2022; Sah et al., 2020), only Tafazoli and Meihami (2023) conducted a narrative study through teachers' autobiographical narratives. De Oliveira and Correa (2020) used experiential reports from one of the article's authors, revealing creative departures from more standard interview techniques. Overall, these results reinforce the predominant use of interviews in qualitative research (Thomas Dotta et al., 2019). The explanation of the necessary adaptation to remote methods during the pandemic and methodological innovation is not very evident in the analysed studies. This conservatism in methodological evolution may point to several underlying factors: the rapid need to adjust to remote data collection, researchers' familiarity and comfort with traditional methods, and possible concerns

about the reliability and depth of data obtained by less conventional means could all have constrained the development of more innovative approaches. While the pandemic catalysed a necessary shift to remote qualitative data collection, the predominant adherence to interviews and limited methodological innovation highlights a potential area for further development in educational research. Future studies should consider integrating diverse and technologically enhanced data collection methods to better capture the complexities of educational experiences during crises. The lessons learned could foster a more resilient and adaptable research methodology, better equipped to handle unforeseen disruptions, and provide a more holistic understanding of educational dynamics.

In terms of participants, teachers feature heavily in the included studies, either exclusively or alongside other participants such as parents ($n = 29$). Despite movements advocating for a greater role for students in teaching and learning processes (Matos et al., 2023), students occupy a peripheral position in research. There are few investigations involving students, and they are often treated solely as sources of information, rather than being engaged in a participatory perspective or aligned with the student voice movement (Cook-Sather, 2018). Although the same may occur with teachers, they are generally more frequently engaged in educational research (Gillett-Swan and Baroutsis, 2023). From the identified studies, it was not possible to discuss the issue of representational justice, as a theoretical concept of adequacy and equitable inclusion of populations and methodologies within the study (Otto and Haase, 2022). So, enhancing representational justice in educational research requires a critical reassessment of both the participant dynamics and the methodological frameworks employed. By embracing more inclusive and participatory approaches, researchers can better ensure that the studies not only address but also embody the principles of equity and inclusivity. This shift is essential for the field to evolve in a direction that truly reflects and serves its diverse constituencies.

RQ4: From face-to-face qualitative data collection to technology-mediated collection

In the analysed studies, there is little or no in-depth discussion regarding the implications or ethical issues associated with conducting technology-mediated data collection, particularly in the case of interviews and focus groups. The studies that reference the implications of online interviews are generally grouped into two categories: those acknowledging them as a limitation without delving into the specific nature of these limitations or their implications for data analysis and interpretation, and those asserting that technology-mediated collection poses no constraints, often justified by participants' familiarity with the virtual environment. The absence of any mention of digital tools for data collection, especially in the case of interviews, may stem from a perceived 'natural' and straightforward transposition of face-to-face interviews to interviews in a virtual environment (Fritz and Vandermause, 2018; Thomas Dotta et al., 2019). This gap highlights the need for more comprehensive studies to ensure the methodological integrity and ethical soundness of technology-mediated data collection. Studies comparing traditional interviews with those mediated by digital tools identify a balance between strengths and weaknesses (Thomas Dotta et al., 2019). Nonetheless, there is consensus that researchers need to develop specific skills to effectively use and adapt data collection in virtual environments to maximise its potential and minimise its limitations (Hershberger and Kavanaugh, 2017; Wendy, 2001).

The exigencies of continuing qualitative research during the pandemic, coupled with the need to investigate its implications across various domains and its impact on researchers themselves, sometimes hindered the development of these skills and adaptations. As in other areas, in qualitative research, urgent measures were taken, understood as 'quick fixes' (Otto and Haase, 2022: 315). The absence of reflection on the transposition of traditional data collection methods to virtual environments can indicate a normalisation of this process and give a false idea that there are no differences. Braun et al. (2020) term this phenomenon the 'onlineification' of research. However, a thoughtless transposition can have significant consequences, as the methodologies employed in empirical research shape our perceptions of social realities through distinct methodological lenses (Otto and Haase, 2022). In summary, the lack of a well-founded approach to the use of online interviews was the most significant weakness identified in the studies analysed. Critically assessing the advantages and limitations of using online interviews in any scenario is an epistemological and methodological necessity for all researchers.

Striking a critical balance between the benefits and limitations of technology-mediated qualitative data collection, as well as exploring adaptive methods and enhancing research skills concerning

technology-mediated data collection, represents a promising trajectory for enriching the domain of qualitative research.

Potential study limitations

The findings of this study have to be seen in light of some potential limitations. For instance, the data collection process considered only two databases – Scopus and WoS – which may have led to relatively low coverage of studies in social sciences (Heck et al., 2023). This issue can be addressed in future studies by developing the search strategy in collaboration with an information scientist.

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Research ethics statement

Not applicable to this article.

Consent for publication statement

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Conflicts of interest statement

The authors declare no conflicts of interest with this work. All efforts to sufficiently anonymise the authors during peer review of this article have been made. The authors declare no further conflicts with this article.

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