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Primary teachers teaching: Pandemic lessons learned and innovations for future practice

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Abstract

The COVID-19 pandemic presented significant challenges for primary education, particularly through Emergency Remote Teaching (ERT). This study investigates the lived experiences of primary teachers in adapting to ERT and explores how these lessons can inform future educational practices. Using a phenomenological approach, qualitative data were gathered from focus group discussions (FGDs) with six primary school teachers in Jambi Province, Indonesia. The findings highlight challenges such as technological readiness, the need for innovative teaching strategies, and the integration of blended learning. Additionally, the study identifies key strategies employed by teachers to overcome these challenges, such as the use of interactive digital tools, structured virtual classroom management, and adaptive lesson planning. This research suggests that future educational resilience can be enhanced through digital learning methods, blended models, and technological innovations, offering a foundation for adapting primary education in the era of Education 5.0.

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Introduction

The COVID-19 pandemic, escalating rapidly from 2019 to 2021, disrupted global education systems. In Indonesia, the pandemic led to abrupt policy shifts, including lockdowns and the closure of schools, which significantly impacted education (Jones & McNulty, 2022). This situation forced educational institutions to transition quickly from face-to-face instruction to Emergency Remote Teaching (ERT), a method adopted with little prior preparation (Bond, 2020; Purwanto et al., 2020). The sudden shift posed unique challenges for primary teachers, especially in the context of limited technological infrastructure in many schools, particularly in rural areas. This study explores the experiences of primary teachers in Indonesia, examining how they adapted to ERT and what lessons can be applied to shape future educational practices.

ERT, distinct from traditional online learning, was implemented as a temporary solution and introduced significant challenges. Many institutions lacked experience with digital platforms, necessitating training, socialization, and preparation for effective implementation (Bond & Bedenlier, 2019). This sudden shift forced teachers to modify pedagogical strategies and lesson plans to meet the demands of remote learning. Primary school teachers, in particular, faced the difficult task of redesigning instructional approaches for digital platforms.

Various studies in Indonesia have examined pandemic-related teaching issues, such as teacher competencies (Arpius, 2020), challenges (Jayantari et al., 2021), and virtual learning implementation (Nuryadin et al., 2021; Solekhah, 2020). Other research focused on lesson plans and learning management during ERT (Otaya et al., 2020; Rahayu et al., 2021). However, limited studies have addressed ERT's implementation in primary schools in developing countries, highlighting the need for further exploration.

This study aims to address this gap by analyzing how primary teachers in Indonesia adapted to ERT and exploring lessons and innovations that could shape future education. While the pandemic posed challenges, it also catalyzed technological integration and innovative teaching strategies. The findings provide insights into new teaching methods and curricula designed to meet students' evolving needs in the post-pandemic era. This aligns with Education 5.0, which emphasizes human-centered, technology-integrated learning models to enhance resilience against future disruptions (Ahmad & Rijal, 2021).

The research questions guiding this study are as follows: (1) How did primary school teachers prepare for remote teaching during the COVID-19 pandemic? (2) What challenges did they face during this process? (3) What potential breakthroughs can be utilized for future practice?

Literature Review

Emergency Remote Teaching (ERT)

Research into Emergency Remote Teaching (ERT) during the COVID-19 pandemic has highlighted significant challenges, such as the rapid shift to online learning, lack of technological readiness, and disparities in access to resources (Bozkurt et al., 2020; Händel et al., 2020). Despite being a temporary solution, ERT demonstrated potential in fostering essential digital skills in both students and teachers, provided they received sufficient technological training and pedagogical support (Bond, 2020). However, challenges persist, particularly in marginalized communities where poor internet access and limited access to technology hinder learning opportunities (Abel, 2020; Shin & Hickey, 2020). Some studies argue that ERT was effective in maintaining learning continuity (Hodges et al., 2020), while others highlight its shortcomings, such as reduced student engagement, lack of hands-on learning experiences, and the difficulty in assessing learning outcomes remotely (Trust & Whalen, 2020). This review also examines the need for blended learning models and suggests that ERT could serve as a foundation for more permanent educational shifts by addressing these limitations.

ERT in Primary Education

The abrupt shift to Emergency Remote Teaching (ERT) presented significant challenges in primary education. Barbour et al. (2020) stressed the importance of defining emerging practices during lockdowns, while Abel (2020) identified key barriers, such as poor internet access and inadequate emotional support, disproportionately affecting marginalized students. Many teachers felt unprepared for the transition (Shin & Hickey, 2020), and limited planning time worsened the situation. Despite these difficulties, ERT showed promise through platforms like Microsoft Teams and Google Meet, which were widely used for virtual learning during the pandemic (Trust & Whalen, 2020). Research highlights the need for strategies like parental involvement and bridging the digital divide to enhance future online learning quality.

Methodology

This study explores primary school teachers' experiences with Emergency Remote Teaching (ERT) during the pandemic, particularly in developing countries with limited technological infrastructure. It highlights challenges such as managing young learners' attention spans, engaging parents, and addressing technological barriers. The research underscores the importance of professional development to improve teachers' digital skills and calls for comprehensive support systems to enhance remote learning quality. It fills a gap in ERT literature by focusing on primary education and provides insights for improving blended learning models post-pandemic. These findings offer practical recommendations for policymakers to address resource disparities and improve teacher preparedness.

This study employed a qualitative research design utilizing a phenomenological approach. This method was chosen because it allows for an in-depth exploration of the lived experiences and perspectives of primary school teachers regarding Emergency Remote Teaching (ERT) during the COVID-19 pandemic (Creswell & Poth, 2018). Phenomenology is particularly relevant for understanding how teachers adapted to the abrupt shift to remote instruction and how they navigated challenges such as limited access to technology, disparities in student abilities, and shifts in their professional roles.

To provide a clearer overview of the research design, Figure 1 presents the process flow of participant selection, data collection, and data analysis. The structured sequence ensured methodological rigor and a systematic exploration of teachers' experiences during the pandemic.

The research process began with the selection of participants through a screening phase utilizing platforms such as email and WhatsApp. In the second step, focus group discussions (FGD) were conducted to explore teachers' experiences in-depth regarding the implementation of Emergency Remote Teaching (ERT). Data were collected through audio recordings and field notes during the FGD sessions. Subsequently, the data were analyzed using coding and thematic analysis, followed by the final stage, which involved drawing conclusions and interpretations to formulate findings and their implications for the study.

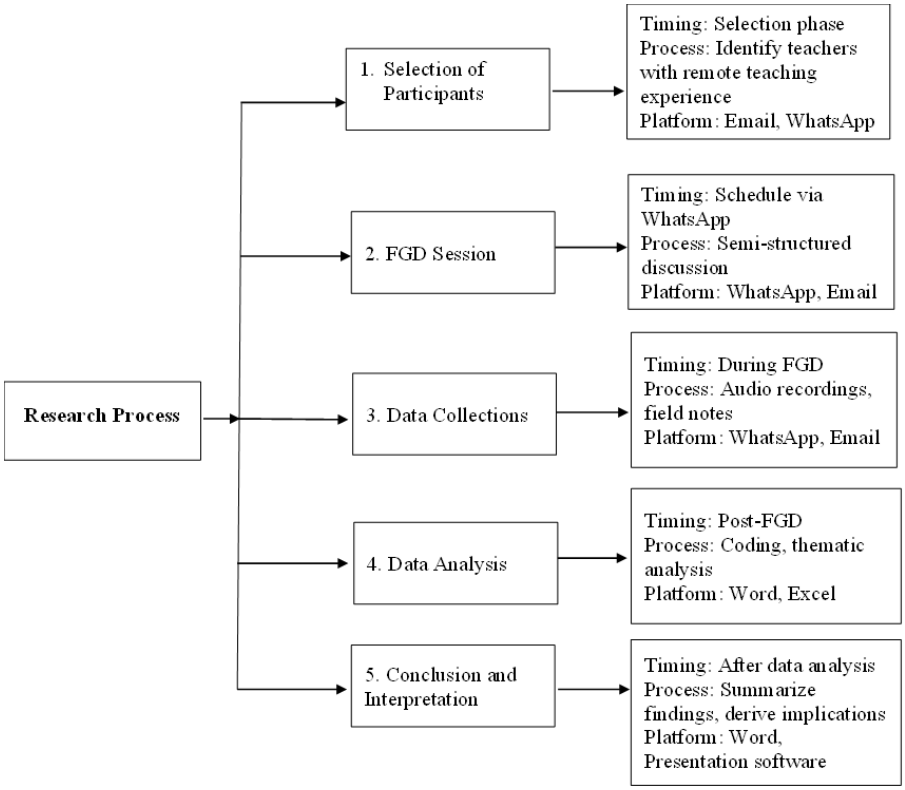


Figure 1 Overview of the research methodology process

Ethical Considerations

Ethical approval was obtained from Jambi University's IRB, following national and international guidelines. Participants received detailed study information, signed informed consent forms, and were assured their right to withdraw. Pseudonyms were used for confidentiality, and data were securely stored.

Self of the Researcher

As researchers with teaching backgrounds, our positionality influenced the focus and design of this study, particularly due to our firsthand experiences during the shift to remote teaching amid the COVID-19 pandemic (Morrow, 2005). We recognize that this may have introduced bias, especially in emphasizing technological and pedagogical challenges. To address this, we maintained reflexive journals, engaged in peer debriefings, and conducted member checks to ensure the validity and credibility of our interpretations. For instance, participant feedback helped refine our coding, such as expanding "technology barriers" to include emotional strain, ensuring a more holistic understanding of teachers' experiences.

Participant Selection and Recruitment

Six primary teachers from Jambi, Indonesia, were purposively selected based on teaching and remote learning experience. Though small, the sample fits phenomenological goals. Codes (T1–T6) ensured participant confidentiality.

Data Collection

Data were collected through semi-structured focus group discussions and document analysis, highlighting teachers' remote teaching experiences. Participants were coded (T) to ensure confidentiality and uphold ethical research standards. The researchers compiled the findings of the participant biodata identification in the following table to make it easier to comprehend the codes and their implications for the participants. Table 1 presents the participant codes used to ensure confidentiality and to clarify the implications of each code for the participants.

Table 1 Participants' Code

Code	Meaning	Teaching Experiences
T1	Teacher 1	12 years
T2	Teacher 2	7 years
T3	Teacher 3	4 years
T4	Teacher 4	9 years
T5	Teacher 5	6 years
T6	Teacher 6	10 years

The data present six teachers involved in a focus group, each identified by a code (T1-T6). The teachers represent a cross-section of the elementary grade levels, with T1 holding the most experience at 12 years in first grade and T3 being the least experienced with 4 years in third grade. This diversity in teaching experience and grade levels provides a valuable range of perspectives for the focus group discussion.

Focus Group Discussion (FGD)

Creswell (2012) defines focus group discussions (FGD) as a qualitative research method for gathering data on a specific topic. FGDs were employed to explore teachers' experiences with planning, implementing, and evaluating remote teaching. Participants were invited via WhatsApp and email, and the discussions were conducted in a school library. The session lasted an hour, with open-ended questions and probing techniques used to gather in-depth insights, which were transcribed and analyzed to identify key themes.

Analysis and Trustworthiness

We used a qualitative data analysis approach (Tomaszewski et al., 2020), starting with collaborative discussions to develop initial codes from participants' statements. Codes like "technology challenges" and "student disengagement" emerged. Themes were refined through multiple rounds, ensuring accuracy. To ensure credibility, we conducted member checks, revisiting codes based on participant feedback to improve data interpretation and deepen understanding of their experiences (Morrow, 2005).

Results and Discussion

Primary Teachers' Experiences in Preparing Emergency Remote Teaching

As shown in Figure 2, teachers' preparation for emergency remote teaching involved three interrelated areas: selecting appropriate learning platforms, ensuring adequate hardware support, and maintaining communication with parents to monitor students' learning progress.

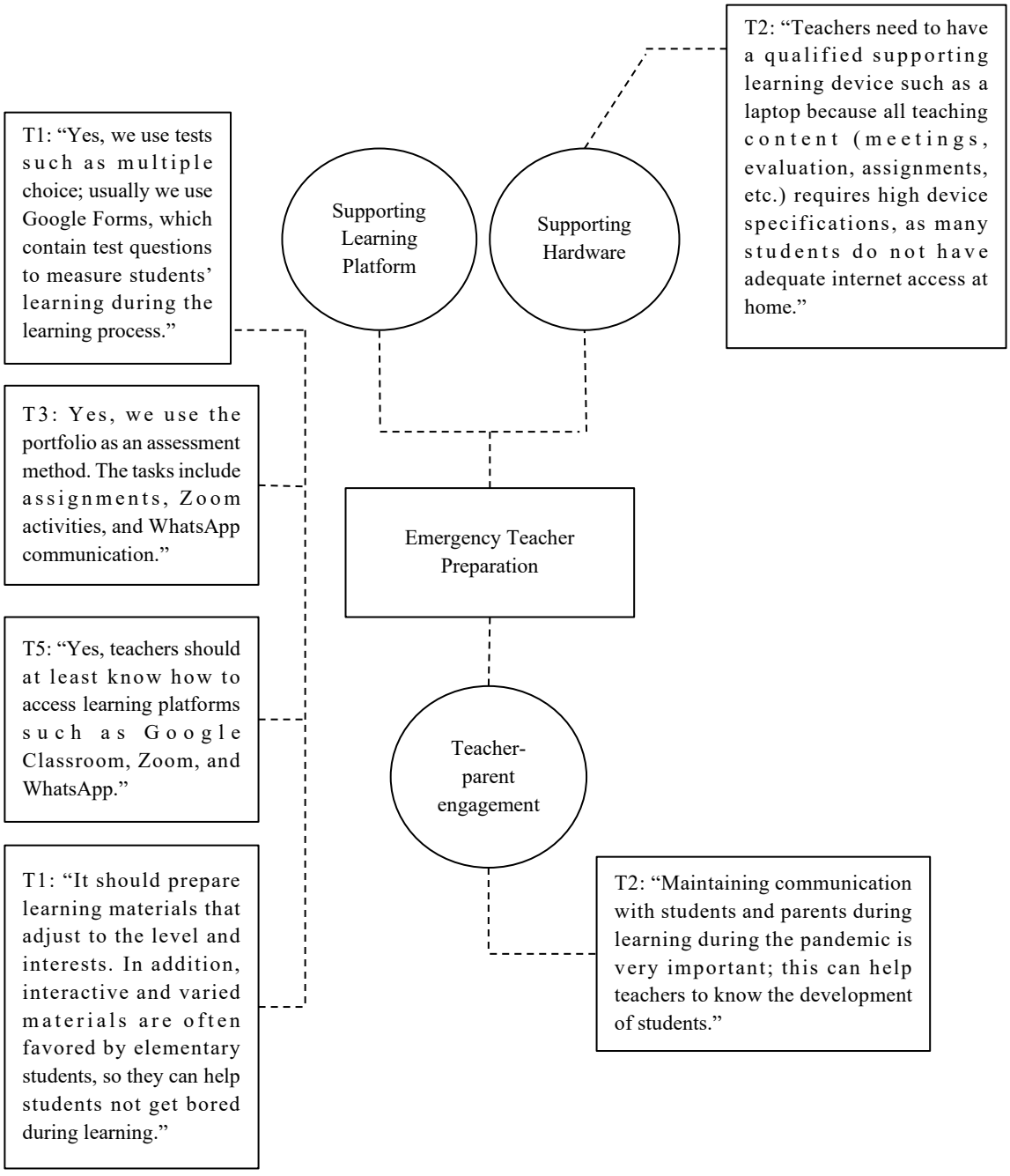


Figure 2 Graphical presentation of participants' responses toward emergency teaching preparation

The successful implementation of Emergency Remote Teaching (ERT) during the COVID-19 pandemic required primary teachers to undertake several key preparations (Emdin, 2020). These included configuring technology, developing learning materials, managing virtual classrooms, and maintaining communication with students and parents. A critical component of these preparations involved ensuring technological readiness, particularly access to devices and stable internet connections, which are essential for effective digital engagement. As Hodges et al. (2020) highlight, the success of ERT depends heavily on the availability of technological tools and reliable infrastructure, making these elements foundational for fostering equitable and efficient online learning environments. Teachers who had access to reliable technology and digital literacy training were better able to engage students and maintain lesson continuity. Conversely, teachers who lacked these resources struggled to ensure consistent student participation, leading to disparities in learning outcomes.

The study findings indicate that students with access to stable internet and well-prepared teachers demonstrated higher levels of engagement and academic performance. In contrast, students facing technological and instructional barriers were more likely to disengage, highlighting the uneven impact of ERT on learning outcomes.

The following is an explanation of this matter:

"Teachers need to have a qualified preparation of learning technology devices before carrying out learning activities. of course, teachers must also crosscheck the availability of student devices. yes, at least have a laptop/smartphone and a stable internet network." (T2)

After following up on these findings, researchers also found that teachers must also be able to master the use of online learning platforms such as Google Classroom, Zoom, WhatsApp, and so on. Here is an explanation from T6 regarding this matter:

"Yes, teachers should at least have the basics to use learning platforms such as Google classroom, Zoom, WA etc.." (T6)

In preparing for online education, primary teachers must focus on developing suitable learning materials. Teachers need to adapt content for digital formats while maintaining engagement and effectiveness for young learners. Participants emphasized creating materials that align with students' developmental levels and the curriculum, using interactive and visually stimulating resources like videos and colorful slides. This approach enhances engagement and prevents boredom during online learning sessions. The study revealed that students who were provided with visually rich and interactive learning content demonstrated sustained engagement and enthusiasm for lessons, while those with passive learning materials experienced reduced participation. The following is an explanation from T3:

"I should prepare learning materials that adjust to the level and interests. In addition, interactive and varied materials are also often favored by elementary students. So, it can help students not to get bored of learning." (T3)

This underscores the need for creativity in designing learning materials. Teachers innovated by creating engaging content, such as interactive videos and vibrant slides, to maintain student attention and motivation during remote learning, compensating for the absence of in-person interaction.

Moreover, managing a virtual classroom required teachers to adopt new strategies for effective learning and discipline. Online tools like Google Classroom, Zoom, and WhatsApp were used to facilitate communication, deliver lessons, and organize activities, helping maintain structure and keep students engaged, similar to traditional classroom settings. The study found that students whose teachers actively managed their virtual classrooms through structured schedules and interactive sessions showed improved academic performance and participation rates. This is mentioned in the following excerpt by T6:

"Yes, teachers should at least have the basics to use learning platforms such as Google Classroom, Zoom, WhatsApp, etc.." (T6)

The adoption of these platforms allowed teachers to efficiently organize their virtual classrooms, distribute learning materials, and monitor student progress in real-time. By leveraging tools like Google Classroom and Zoom, teachers were able to recreate some of the structure and routines of a traditional classroom environment, ensuring that students remained engaged and learning could continue seamlessly in a virtual space. These platforms became integral to maintaining a sense of order and continuity in the learning process.

Adapting assessment strategies to the online format was another essential aspect of this transition. Teachers had to employ innovative methods to evaluate student performance remotely. According to the findings, primary teachers frequently utilized portfolio assessment as an alternative approach to measure student achievement. This method allowed them to assess students' work over time, providing a more comprehensive view of their learning progress and development in the absence of traditional testing environments. The study findings indicate that students who were assessed using diverse methods, such as digital portfolios and formative assessments, exhibited more consistent learning progress compared to those evaluated solely through online quizzes. This is mentioned in the following excerpt by T1:

Yes, we use the portfolio as an assessment material. The trick is to look at students' work, and assignments during the learning process. (T1)

Any given question may be in the form of quizzes or multiple choices that lead students' opinions. The results of the study revealed that there are several ways utilized by the teachers in dealing with Google Forms to assess students' learning outcomes. This is explained in the following:

"We use tests such as multiple choice, so usually we use the Google Form which contains test questions to measure students' abilities during online learning." (T5)

Effective communication with both students and parents was critical for the success of ERT. Teachers needed to establish reliable channels for disseminating information about schedules, assignments, and student progress. Establishing effective communication channels with students and parents, such as through emails, text messages, or WhatsApp groups, to provide information about learning schedules, assignments, and student learning progress is an important point that teachers should consider. The study found that students whose parents actively engaged in communication with teachers showed higher levels of motivation and academic progress, reinforcing the critical role of parental involvement in remote learning. As explained in the following quote:

"Maintaining communication with students and parents during learning during the pandemic is very important. This can help teachers to know the development of students." (T2)

This finding suggests that parent-teacher collaboration became increasingly important during ERT, as parents often played a more active role in supporting their children's learning at home.

Primary Teachers' Challenges in Emergency Remote Teaching

Figure 3 illustrates the main challenges identified from the thematic analysis regarding primary teachers' experiences in emergency remote teaching.

Several participants explained that the *teaching time given during ERT was very limited*. They felt that the duration of time was not sufficient to implement all teaching materials. Some students were often unable to take lessons due to the limitations of gadgets and quotas. The study found that students who had access to stable internet and adequate learning materials performed better than those who faced connectivity issues and limited teacher support. Teachers also reported that students from lower-income backgrounds were disproportionately affected, as they struggled to access digital devices or afford sufficient internet data. This is explained by T1 in the following quote:

The duration of online learning is very short and it is deemed insufficient for the delivery of the entire material, also, the number of students who take online lessons is less than 50 percent due to the limitations of gadgets and student quotas. (T1)

In response to this, T3 explained that the learning ma*terials were not optimally implemented as well*. This happened because the teacher was pressured at the given time during the lesson during the covid-19 pandemic. The following is an explanation of this:

"The material is not optimal due to the limited time allocated, so I race during that time." (T3)

The study found that students who had regular interactions through video calls or discussion forums showed better engagement and comprehension whereas those who relied solely on asynchronous materials often struggled to stay motivated. Participant 3 explained this in the following quote:

"*For learning, there is a lack of interaction between students and their teachers so that learning is not effective and the results of student learning outcomes are not satisfactory for the teacher." (T3)*

According to T2, most of primary teachers face *difficulty in designing interesting interactive learning models.* The following is an explanation regarding this:

"*In normal learning we usually use a variety of learning models, now in this online learning we are limited to only using a few learning models that are suitable and can be applied in this online learning platform." (T2)*

After that, several primary teachers explained if there *is a limitation in controlling students' activity during ERT*. Therefore, this causes students to be free to cheat, and break their concentration to learn. T1 described that the students were only present to fill attendance, and then disappeared one by one during the online class.

"*The student involvement rate is very low; at the beginning of the learning session, they are only present for attendance and after that they disappear one by one until only a few students are left, which gradually ends their online learning period." (T1)*

The result showed that T4 explained that it *was difficult for them to assess student learning outcomes* because of the involvement of parents in the process of solving the problem.

"I have difficulty in assessing student learning outcomes." (T4).

Possible breakthrough for ERT: The lesson learned in post-pandemic

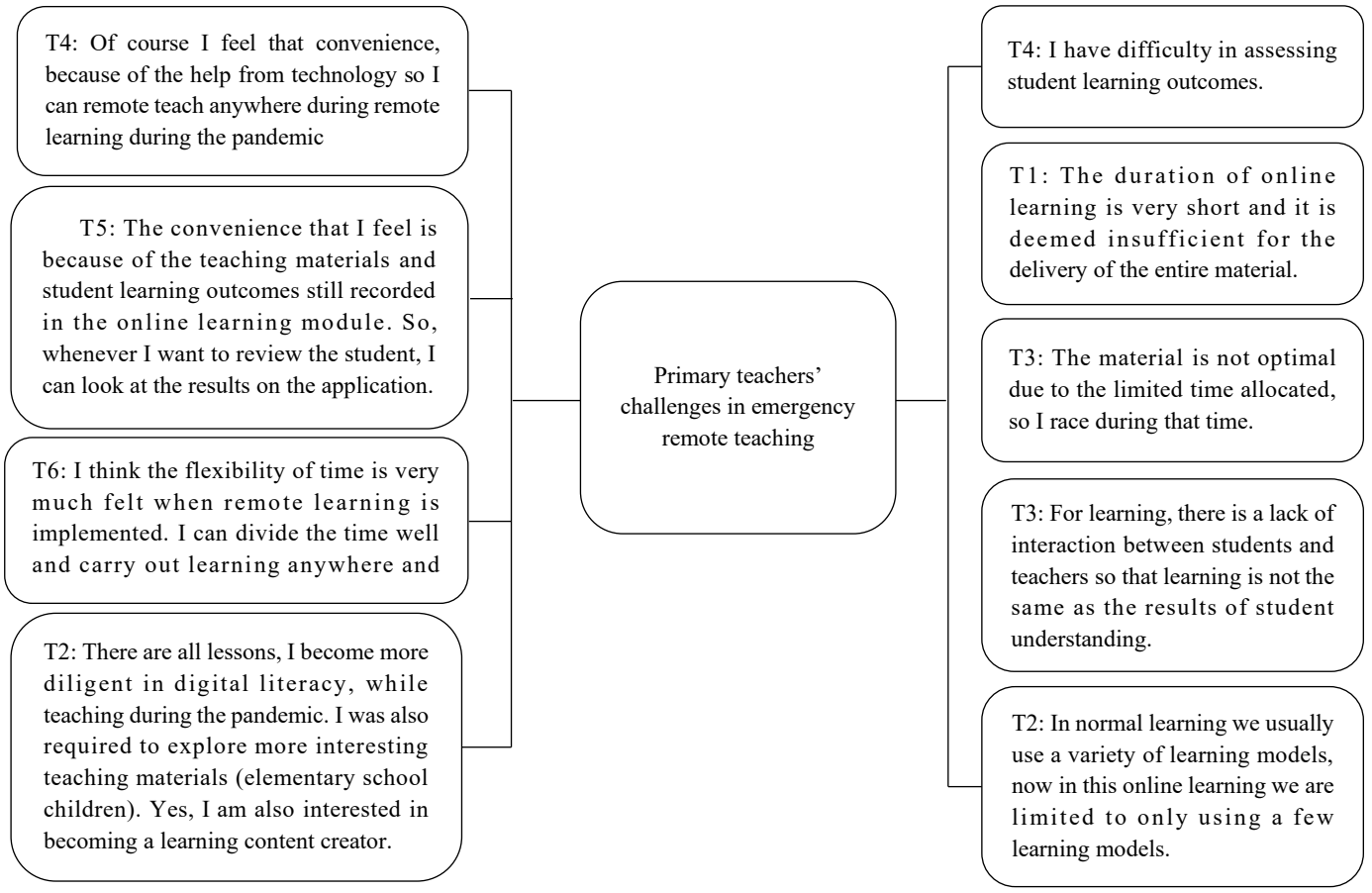


Figure 3 Graphical presentation of participants' responses toward primary teachers' challenges in emergency remote teaching

The study identified three sub-themes for potential improvements in ERT: shifting the learning path into blended learning, personalizing monitoring and feedback, and building up teachers' enthusiasm in enhancing teaching skills using technology.

Shifting the Learning Path into Blended Learning

More than a year of struggling with the teaching process during the pandemic has resulted in teachers surviving the challenges of emergency remote teaching. Various challenges cause them to be able to think more creatively to cope with challenges. This can be a lesson that can be learned by teachers, especially primary teachers after the COVID-19 pandemic ends (Samala et al. 2024). Some teachers have successfully implemented blended learning by combining live online sessions with pre-recorded instructional videos and interactive digital assignments. The flexibility of this approach allowed students to revisit materials at their own pace while still benefiting from real-time teacher support.

According to the findings in this study, researchers found that some teachers have implemented blended learning systematically, in which they apply the variation of material delivery system. The primary teachers explained that they still use social media and several learning platforms that are trendy to implement emergency remote learning during the Covid-19 pandemic. The following is an explanation from the participants regarding this matter:

"I still use some of the learning platforms that were trending during the covid-19 pandemic. In fact, it really helps me to make learning more interesting." (T6)

Meanwhile, based on the research results, it is explained that these learning platforms are used as supplementary learning tools. For example, teachers use social media to give assignments to students while maximizing in-person classroom

interactions for discussions and problem-solving. This is described in the following quote:

"After the post pandemic, I actually use variations of learning by still integrating technology and face to face learning." (T6)

"I usually use the learning platform to give assignments." (T3)

"I use the internet to provide relevant resources and as an online worksheet for students." (T5)

Based on the explanation mentioned earlier, researchers found that some of the participants actually used the pandemic as a lesson to be able to vary their learning strategies. It found the lessons behind the difficulties in implementing their emergency remote learning during the covid-19 pandemic. These lessons were transformed into a way to create and maintain a sophisticated and engaging learning process.

Personalizing monitoring and feedback

Beyond the pandemic and emergency remote teaching, several other lessons can be implemented in subsequent learning. One of the findings of this study revealed that learning from home creates a new model of communication and feedback. During emergency remote teaching, many of the primary teachers used WhatsApp, Instagram and Google Classroom to implement monitoring and feedback activities.

Teachers who maintained direct communication channels with students and parents observed higher completion rates for assignments and improved student motivation. Regular check-ins through WhatsApp groups or one-on-one digital feedback helped ensure students stayed on track with their learning progress.

Here are the explanations of some of the participants in this study:

"We are usually always on WhatsApp to monitor learning activities." (T2)

"I usually monitor the progress of student assignments through group chats on WhatsApp." (T4)

"I usually give feedback and remind tomorrow's learning announcement through group chat in WA and Google Classroom." (T5)

"I give scores or feedback directly in the comments column when students upload assignments on social media." (T3)

Then, the researchers also discovered that some of the participants also explained that providing this feedback can make students feel supervised by the teacher for 24 hours. Besides, through personalized monitoring and feedback from social media, it can normalize the interaction between teachers and students outside of class hours. Hence, they can communicate and learn outside of class hours. Moreover, this makes students feel that teachers are always alert and ready to guide them. This is explained by the participants in the following quotes:

"Through personal monitoring and feedback from social media, I can give the impression that I am always monitoring my students all day long." (T2)

"In my opinion, providing feedback from social media, especially group chat, can make students feel that their teacher is always available to ask. And I can also serve them more optimally." (T4)

Building up teachers' enthusiasm in enhancing teaching skills using technology

The COVID-19 pandemic has forced teachers around the world to shift to distance learning using technology. Despite the challenges faced by teachers in adapting quickly to this change, there are also opportunities to improve their teaching skills with technology. The study found that teachers who actively engaged in technology training workshops or professional development programs reported greater confidence in using digital tools for instruction. This, in turn, resulted in more innovative lesson delivery and improved student engagement.

The use of technology in emergency remote learning can be overwhelming for teachers at first. However, the results of the study found by (Johnson, 2021) explain, that after the pandemic, the teachers have managed to reconcile and like the integration of technology in learning. Such is in line with this study. The researcher found that there was an openness in the teachers' views towards knowledge innovation. The majority of teachers showed their openness and enthusiasm towards the use of technology in learning during the pandemic. They see this situation as an opportunity to try new and innovative methods that they may not have tried before. This is explained in the following quote:

"Experiencing the problems a few years ago, I was inspired to improve my technology skills for teaching." (T3)

Based on the findings presented by (Smith & Jones, 2020), there is an increase in the ability to use technology owned by teachers after the pandemic period. Related to this, the findings also reveal that teachers have improved their technology skills. While there may initially be challenges in mastering new technologies, most teachers reported that they developed their technology skills quickly during the pandemic. They have become more proficient in using various learning platforms, apps, and technology tools.

"I used to teach without using technology. After this pandemic, I became interested in integrating learning using technology." (T2)

The results of this study highlight the importance of learning during the pandemic as a stimulus to improve teaching skills using technology. Teachers need to be supported and

given opportunities to continue developing these skills, as well as recognized for their efforts and achievements in facing learning challenges during the pandemic. This may bring positive impacts in improving education quality and preparing teachers for future learning challenges.

Discussion

This study delves into primary school teachers' experiences with Emergency Remote Teaching (ERT) during the COVID-19 pandemic, focusing on their adaptations to unprecedented challenges in transitioning from traditional classrooms to digital learning environments. Through FGD, the research reveals how teachers navigated technological preparations, developed digital materials, and maintained communication with students and parents to ensure learning continuity. The findings align with Emdin's (2020) assertion that effective distance education requires meticulous planning, yet this study further suggests that teachers' adaptability was influenced by their prior digital literacy levels and institutional support.

The study also underscores the simplicity of certain remote teaching procedures. Many teachers found that digital resources enhanced lesson creativity, offering flexibility in time and location. However, the shift to ERT brought significant obstacles, including limited instruction time, poor internet connectivity, and challenges in maintaining student engagement. Drawing on pedagogical theories such as digital pedagogy and constructivism (Piaget & Inhelder, 1969), these findings indicate that teachers had to shift from teacher-centered instruction to more student-centered approaches, requiring greater student autonomy and digital fluency.

Teachers noted difficulties in assessing student performance accurately, as remote settings increased opportunities for distractions and academic dishonesty, especially with parental involvement. These findings are echoed in studies from various international contexts. For instance, Rapanta et al. (2020) in Portugal and Reich et al. (2020) in the United States similarly reported challenges in student engagement, equity in access, and parental over-involvement during ERT. In contrast, research conducted in Finland (Mankki, 2022) and South Korea (Kim & Asbury, 2020) showed that with strong digital infrastructure and institutional readiness, teachers experienced more successful implementation and higher student participation, suggesting that context significantly affects ERT outcomes. Such comparisons indicate that while challenges are shared globally, their intensity and impact vary, underscoring the importance of tailored support systems.

Despite these challenges, the study identifies pivotal breakthroughs in educational practices. The transition to ERT prompted a shift toward blended learning models (Samala et al., 2024), with teachers increasingly integrating digital tools post-pandemic. Additionally, new communication methods using platforms like WhatsApp, Google Classroom, and Instagram fostered more personalized feedback and extended interactions beyond traditional classroom hours. Teachers who engaged in professional development workshops during the pandemic reported higher confidence in using digital platforms, which directly enhanced their ability to integrate blended learning strategies effectively.

Furthermore, the study highlights the enhancement of teachers' technological competencies. Initially overwhelming, the transition to digital teaching ultimately encouraged teachers to embrace innovative practices and improve digital literacy (Johnson, 2021; Smith & Jones, 2020). For example, teachers who initially relied on basic video conferencing later adopted interactive tools such as Kahoot, Google Forms, and Padlet to make lessons more engaging and assess student understanding more dynamically.

In conclusion, this research demonstrates that while ERT posed significant challenges, it also spurred lasting changes in teaching approaches. The findings suggest that blended learning, digital communication tools, and innovative pedagogies will continue shaping education, emphasizing the need to equip teachers with adequate training and resources for digital adaptation. Future policies should focus on structured professional development programs, ensuring that teachers continue to receive support in integrating technology effectively into their teaching practices. Additionally, governments and institutions should invest in equitable digital infrastructure to mitigate the learning disparities observed during ERT.

Conclusion and Recommendation

This study contributes to the growing body of research on Emergency Remote Teaching (ERT) by exploring how primary teachers adapted during the COVID-19 pandemic. The findings highlight the resilience and creativity of teachers who maintained learning continuity despite minimal preparation. Among the most effective strategies identified were the integration of blended learning models, the use of personalized feedback mechanisms, and the adoption of digital tools that facilitated interactive engagement. These innovations enabled teachers to sustain instructional quality despite significant barriers.

Teachers transitioned from face-to-face to digital teaching, navigating new technologies and pedagogies. However, findings suggest that not all teachers adapted at the same pace, with those receiving professional development training demonstrating greater ease in technology integration and pedagogical flexibility. This highlights the need for continued investment in teacher training to enhance digital literacy and instructional adaptability.

Future research should examine the long-term impacts of ERT on student outcomes, teacher development, and educational quality. It is crucial to explore the sustainability of blended learning models and digital tools in regular educational practices. Additionally, further studies should assess the role of digital equity in ensuring that all students have equal access to technological resources, which remains a persistent challenge in many educational settings.

In conclusion, while ERT presented significant challenges, it also catalyzed meaningful innovations in teaching practices, emphasizing the growing role of digital tools in modern education. To build on these advancements, policymakers should establish national frameworks that mandate continuous professional development for teachers, specifically targeting digital pedagogy and blended learning strategies. Educational authorities should design scalable training programs that are accessible even in rural or underserved regions, ensuring equitable teacher capacity-building.

Moreover, curriculum developers should integrate technology-enriched learning objectives, promote interdisciplinary digital literacy, and embed flexible assessment models suitable for both online and offline settings. Governments and institutions must also invest in robust and inclusive digital infrastructure, such as subsidized internet access and device provision for students and teachers, to minimize learning disparities. By implementing these strategic actions, the lessons learned from ERT can serve as a foundation for a more resilient, equitable, and future-ready education system.

Conflict of Interest

The authors declare that there is no conflict of interest.

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