

Article

Navigating Challenges and Innovations in Emergency Online Teaching: A Qualitative Inquiry

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Abstract: The COVID-19 pandemic disrupted U.S. K-12 education systems, forcing teachers to adopt emergency remote teaching with minimal preparation. This study investigates the challenges and adaptive strategies of 16 U.S. K-12 educators during the pandemic. Qualitative analysis of semi-structured interviews with 16 educators was conducted to identify key themes. Findings reveal that innovative engagement strategies—including interactive activities, long-term projects, and inclusive virtual environments—were pivotal for sustaining participation. Challenges such as disparities in students' home environments, technical limitations, and motivational declines underscored the need for parental collaboration, emotional support frameworks, and teacher-specific professional development. These results highlight actionable pathways to strengthen resilience and equity in online education systems during crises.

Keywords: online teaching; emergency teaching; teacher experiences; student engagement; educational challenges



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1. Introduction

Online learning has been one of the most rapidly growing features in education over the past twenty years, valued for its convenience and flexibility [1–3]. By the fall semester of 2015, over 6 million students in the United States were enrolled in at least one online course [1]. Despite its growth, online learning presents numerous challenges that both educators and students must address. In the U.S. context, studies highlight systemic challenges such as the “homework gap” [4], where 17% of U.S. students lacked adequate internet for remote learning [5]. These disparities intensified during the pandemic, particularly in underfunded U.S. school districts.

Challenges in online learning extend beyond the COVID-19 pandemic, including the lack of face-to-face interaction, difficulty maintaining student engagement, and technical difficulties with online platforms and tools [6,7]. Additionally, there are significant issues related to assessment and evaluation, as well as concerns about equity and access for students with limited technological resources and disabilities [8]. Online teachers also face challenges in assessing student understanding and providing effective feedback [9].

Despite these challenges, with the right approach and support, online learning can be both effective and rewarding for educators and students [10,11]. The sudden shift to remote learning during the COVID-19 pandemic has further underscored these challenges and

highlighted the need for adaptable and resilient educational strategies. This paper explores the challenges of emergency remote teaching in U.S. K-12 classrooms during the COVID-19 pandemic through the lived experiences of 16 U.S. educators. While global studies address pandemic-related educational disruptions, this work focuses on teachers in the United States, where systemic inequities in technology access and preparedness disproportionately impacted marginalized student populations.

2. Literature Review

2.1. Social and Emotional Challenges

One of the significant challenges of online learning during the COVID-19 pandemic has been providing social and emotional support for students and teachers [12,13]. The sudden shift to remote learning disrupted traditional forms of socialization, such as face-to-face interactions with teachers and peers, negatively impacting students' motivation and engagement in learning [14–16]. Additionally, students faced stress and uncertainty related to the pandemic, such as financial insecurity, health concerns, and isolation, further exacerbating their motivation and engagement [17–19]. While these studies highlight the detrimental effects on students' emotional well-being, they often lack longitudinal data to understand long-term impacts. Furthermore, there is a gap in research focused on effective strategies for providing social and emotional support in an online setting.

2.2. Home Environment and Socioeconomic Status (SES)

Research indicates that the home environment significantly affects students' ability to learn and succeed online [20,21]. The COVID-19 pandemic underscored the importance of the home environment in online learning and teaching [22–24]. Students had to learn and study in their living spaces, presenting various challenges, including access to technology and the internet, quiet study space, and parental support [25,26]. For instance, Hussein et al. [27] found that students faced distractions and interruptions from family members and household tasks, impeding their ability to focus and learn [28]. The National Center for Education Statistics (NCES) reported that students from low-income families had less access to technology and the internet, negatively affecting their online learning participation [5]. Additionally, inadequate or uncomfortable study spaces and lack of privacy impacted students' mental and physical well-being, especially for those from disadvantaged backgrounds [29]. While these studies provide valuable insights into the challenges faced, they often overlook the coping mechanisms students and families might adopt. There is a need for research exploring effective interventions to mitigate these home environment challenges.

2.3. Readiness for Online Teaching

Although online learning existed before the pandemic, the crisis exposed the lack of preparedness among teachers and schools [30,31]. Many teachers had little to no prior online teaching experience [32,33], and schools were unprepared for the sudden transition, lacking appropriate technology and professional development [34]. This led to inconsistent online instruction quality, with some students receiving high-quality instruction while others received inadequate teaching [35,36]. The strength of these studies lies in their identification of systemic weaknesses, yet they often fail to provide detailed, scalable solutions for improving readiness. There is a trend towards recognizing the importance of continuous professional development and infrastructure improvement, but comprehensive, actionable frameworks are still sparse.

2.4. Changing Roles of Online Educators

The role of online educators has evolved significantly. Coppola et al. [37] identified three roles requiring change: cognitive, affective, and managerial. Teachers need to transition from being knowledge experts to facilitators. Ní Shé et al. [38] further summarized the roles of online educators, including managerial, social facilitator, pedagogical, technical, assessor, designer, adviser, and researcher. Gorsky and Blau [39] emphasized principles of effective online teaching, such as increasing student interactions, encouraging active learning, and providing prompt feedback. Effective online teaching also requires social presence, facilitation, and cognitive presence [40,41]. These studies highlight the multifaceted role of educators but often lack practical guidance on how teachers can effectively adapt to these roles. Future research should focus on providing detailed strategies and training programs to support teachers in these transitions.

2.5. Best Practices for Online Teaching

Effective online courses should be systematically structured and consistent to help students understand the learning process and track their progress [42]. Clear expectations and standards should be set from the start [43]. Teachers need to facilitate online discussions constructively, creating a supportive environment that values student participation [44]. Both teachers and students should contribute knowledge to the online community, enriching the discussion and promoting metacognition [45]. While these best practices are well documented, the challenge lies in their implementation across diverse educational contexts. More research is needed to explore how these practices can be adapted to different student populations and learning environments.

2.6. Research Purpose

The literature consistently highlights the challenges and evolving nature of online education during the global transition to online teaching. Key strengths include the identification of critical issues such as social and emotional support, home environment disparities, readiness for online teaching, changing educator roles, and best practices. However, there are notable gaps, particularly in providing long-term solutions, practical strategies for educators, and adaptive interventions for diverse learning contexts. Trends indicate a growing recognition of the need for robust support systems, continuous professional development, and scalable frameworks to enhance online education's effectiveness. This study aims to explore the various challenges of online teaching and learning through teachers' lenses and to provide suggestions for overcoming these obstacles to improve the effectiveness of online education, which has become widely used during and after the pandemic. The central research question guiding this study is the following: What were teachers' online teaching experiences during the emergency teaching period at the outbreak of COVID-19 in 2020?

3. Method and Procedures

3.1. Participants

Participants were K-12 educators from public schools in the Midwestern United States, recruited via a university IRB-approved protocol (IRB-2021-379). This regional focus captures challenges unique to U.S. educational infrastructure, including disparities in rural internet access and district-level resource allocation. After receiving IRB approval, the research team sent a mass email to K-12 public school teachers in three Midwestern U.S. school districts, targeting educators who taught during the 2020–2021 academic year. The email was distributed via district-wide listservs and included teachers across diverse grade levels (elementary, middle, high school) and subjects (general education, math, social

studies, etc.). Interested teachers completed a short survey, and those who responded were contacted via email to schedule an interview. Twenty-four teachers filled out the survey, with sixteen completing the interviews. Each interviewee received a USD 10 gift card. The interviews, conducted in June and July 2021, lasted between fifteen and forty minutes. The first two authors developed and followed the interview protocol with assistance from a field expert. Table 1 provides detailed participant information.

Table 1. Demographic information of the teachers.

Pseudonym	Age	Race	Grade	Subject	Degree	Working Experience	Teaching Award	Interview Date
Andy	29	White	Elementary	General	Master's	6–10 years	Teacher of the Year in 2020	24 June 2021
Neil	44	White	Middle	Social studies	Bachelor's	16 and more	Middle School Teacher of the Year, 2018	14 June 2021
Joan	29	White	Middle	Reading	Bachelor's	1–5 years	Student's Choice Teacher of the Year, Award for Excellence in Student Teaching	21 June 2021
Melissa	54	White	Middle	English	Master's	16 and more	District Teacher of the Year, Building-Level Teacher of the Year	17 June 2021
Sam	25	White	High school	Social studies	Bachelor's	1–5 years	Impact Teacher	22 June 2021
Ryan	43	White	Elementary	Math	Master's	11–15 years	Not specified	16 June 2021
Kurt	35	White	Elementary	General	Bachelor's	6–10 years	Not specified	25 June 2021
Ye	48	Asian	High school	World language	Master's	16 and more	Teacher of the year	12 June 2021
Jessica	48	White	Elementary	General	Master's	16 and more	Not specified	29 June 2021
Lauren	29	White	Elementary	General education subjects	Bachelor's	6–10 years	Teacher of the district	24 June 2021
Mike	35	White	Elementary	Math	Master's	11–15 years	Not specified	14 June 2021
Jenny	38	White	High school	Math	Master's	16 and more	Not specified	9 June 2021
Annie	27	White	Elementary	General	Bachelor's	1–5 years	Not specified	22 June 2021
Terri	60	White	Elementary	Social emotional learning	Master's	16 and more	Award for dedication to the students	21 June 2021
John	61	White	High school	Social studies	Master's	16 and more	Teacher of the district	8 July 2021
Kimberly	26	White	Elementary	General	Bachelor's	1–5 years	Not specified	7 July 2021

3.2. Data Collection

Informed consent for participation was obtained from all subjects involved in the study. Teachers provided information via a short survey about their age, teaching experience, subjects and grade levels taught, highest degree earned, and any awards. Consenting teachers participated in brief online interviews conducted by the first two authors.

3.3. Data Analysis

We used Braun and Clarke's [46] six phases of thematic analysis, employing an inductive, data-driven approach to identify themes at a semantic level through a realist lens. The significance of themes was not based on frequency but on referential adequacy.

First, we uploaded interview transcriptions to NVivo 12 and read them to grasp teachers' experiences, noting potential codes. Three coders independently coded two transcriptions, compared codes, and developed a coding scheme. Using this scheme, they coded the remaining transcriptions, documenting new codes. We merged all codes in NVivo to check consistency [47], held meetings to resolve differences, and generated potential sub-themes and themes.

We reviewed and refined the themes to ensure they accurately represented teachers' experiences. After examining conceptual coherence, we reorganized data within themes, defined sub-themes and themes, and extracted representative quotes to report the results.

3.4. Addressing Coding Bias

We employed several strategies from Nowell et al. [48] to address coding bias throughout the data analysis. The first authors documented their thoughts and analytical memos in NVivo while reading interview transcriptions to reflect on the teaching experiences described. A clear audit trail was maintained, recording the code generation process,

rationale for selecting and categorizing codes, team meeting discussions, and consensus or disagreement on themes. Peer debriefing and member checking were also used for external feedback. The first authors discussed key data features with two teachers involved in emergency online teaching and sent potential results to all participants for accuracy checks.

3.5. Positionality

Understanding teachers' perceptions of online classrooms during the pandemic was crucial, so we conducted sixteen interviews. We acknowledge that researchers' perspectives can affect qualitative studies [49]. One of the collaborative authors and the second author had online teaching experience before and during the pandemic in a college setting, giving them similar experiences, albeit with young adults. The second collaborative author helped ensure the other authors did not influence their data interpretation. The authors adopted a post-positivist paradigm, including multiple voices to inform the study [50].

4. Results

This study identifies five key themes (see Table 2) in online teaching during the emergency transition: innovative engagement strategies, creating a safe and inclusive environment, enhancing parental involvement and emotional support, and supporting teachers and students. These themes highlight the challenges and effective practices experienced by teachers. All participant names used in this study (e.g., Joan, Kurt, Lauren) are pseudonyms to protect confidentiality. Identifying details have been anonymized in accordance with IRB ethical guidelines.

Table 2. Summary of key themes, strategies, and challenges.

Theme	Key Strategies	Challenges	Examples
1. Innovative Strategies for Online Teaching Engagement	<ul style="list-style-type: none"> • Interactive tools (Kahoot, Flipgrid, Canvas) • Long-term projects • Collaborative breakout rooms • Self-directed learning (choice boards) • Self-assessment practices 	<ul style="list-style-type: none"> • Monitoring group dynamics remotely • Sustaining student interest in virtual settings 	<ul style="list-style-type: none"> • Gamified quizzes • Student-led video reviews • Choice-based assignments
2. Ensuring a Safe and Inclusive Online Learning Environment	<ul style="list-style-type: none"> • Safe spaces for mistakes • Clear expectations (e.g., cameras on) • Alternative participation modes (chat/text) 	<ul style="list-style-type: none"> • Balancing structure with flexibility • Managing distractions in home environments 	<ul style="list-style-type: none"> • Non-verbal student thriving via chat interactions • Breakout rooms for shy students
3. Challenges in Online Teaching	<ul style="list-style-type: none"> • Asynchronous options for absent students • Parental accountability workshops 	<ul style="list-style-type: none"> • Home environment disparities (no quiet spaces) • Declining motivation • Technical issues (rural internet gaps) • Uncertainty in teaching practices 	<ul style="list-style-type: none"> • Students juggling caregiving roles • Pre-recorded lessons for connectivity issues

Table 2. Cont.

Theme	Key Strategies	Challenges	Examples
4. Enhancing Parental Involvement and Emotional Support	<ul style="list-style-type: none"> • Parental training on digital tools • Virtual check-ins for socioemotional support 	<ul style="list-style-type: none"> • Overinvolvement vs. disengagement • Lack of parental capacity due to work/resource constraints 	<ul style="list-style-type: none"> • Workshops on LMS navigation • Peer interaction activities to reduce isolation
5. Supporting Teachers and Students in Online Learning	<ul style="list-style-type: none"> • Peer collaboration (resource sharing) • Paraprofessional support for disabilities • Professional development (PD) programs 	<ul style="list-style-type: none"> • Lack of hybrid pedagogy training • Teacher burnout • Inconsistent district-level support 	<ul style="list-style-type: none"> • Shared repositories for lesson plans • Mentorship programs for new tools

4.1. Theme 1: Innovative Strategies for Online Teaching Engagement

Involving students with various activities and technologies: During emergency teaching, teachers meticulously designed activities to keep students engaged, such as providing more demonstration activities, differentiated activities, concise mini-lessons, and hands-on activities with technology. Joan emphasized the importance of embracing new technologies and gamifying online teaching with trivial games or quizzes to maintain engagement. Kurt highlighted offering students choices in learning tasks to foster engagement and creativity. Ryan noted the need for various outlets like competitions, one-on-one sessions, or small group sessions to showcase learning progress through multimedia platforms such as Flipgrid, Kahoot, and Canvas.

Encouraging student creativity through long-term projects: Lauren shared, “I had some students present Google Slides, create videos, it was really neat, and they were able to show all sorts of various things from singing, dancing, gymnastics, so it was kind of a chance for them to feel comfortable, but also feel that success I’m good at”. Mike added, “Do more long-term projects, so the students weren’t just doing short little assignments day-to-day, but maybe working on bigger assignments where they got to insert more of their personality and more of their individual interests”. Making learning materials relatable to students’ lives through hands-on learning was equally crucial. Ryan, a math teacher, explained, “Once you find situations in their own life that they can relate to with the topics that we’re talking about, whether it’s measurement conversions or decimals or fractions, just trying to find ways to make it relatable to them and give them ways to use manipulatives or talk it out in conversation, just giving them. . . Instead of just straightforward, here’s a problem, here’s how to solve it, you lose, and students can lose interest in that very quickly”.

Enhancing collaborative learning online: Teachers found it challenging to facilitate collaborative learning online but recognized its importance. They used flexible grouping and breakout rooms to enable student interaction. Ryan stated, “Especially with their peers, I think it’s important that they have that interaction, conversations, when I see them creating their own ways to a problem and being able to explain it to me or the rest of class, I think that there’s a kind of an a-ha moment where they can definitely show that they’re getting it”. Jenny added, “If I can get kids talking to each other more, it could definitely help, especially when they’re stuck at home”.

Fostering self-directed learning: Teachers emphasized the need for student-produced work rather than teacher-led videos. Jenny mentioned presenting students with open-

ended problems to encourage self-expression and thinking. Kurt shared, “For my reading journals, sometimes they have to read a passage and then they give a video review of that book or that passage that they read, sometimes they might have to summarize it just by typing it out, sometimes I might have them do some kind of Venn diagram”. Lauren supported this approach: “I like to do choice boards and things, so that kind of gives them the opportunity to go through and do what they feel most connected to, and that makes a more authentic learning experience. . . They are more invested in their assignment, so I think the choice boards give them some structure, but it also ties them room to kind of grow and take it and run with it in a really cool direction. . . so it’s kind of allowing them to tap into whatever they feel is their strengths. It makes them feel like they have some control”.

Highlighting the importance of self-assessment: Neil highlighted the importance of self-assessment: “When students were involved with more self-directed activities, students were able to self-assess more, because it was a ‘huge challenge’ for teachers to reach out to every student and communicate with them well about their works during emergency online teaching”. Kurt observed, “I found that students got very bored if they’re just staring at you through a computer screen, so giving them choices to integrate using groups online, at first I was not very comfortable with that, but once I used the technology to my advantage, having students meet virtually in groups and being able to bounce back and forth between the different groups and just listen to their collaboration was really helpful ‘cause it really mirrored what we did in the classroom”.

4.2. Theme 2: Ensuring a Safe and Inclusive Online Learning Environment

Creating a safe space for mistakes and learning: Creating a safe online environment where students can make mistakes and learning from them fosters creativity and problem-solving without the pressure of assessment. Lauren mentioned that online teaching allows students time to think, experience struggles, and attempt to solve problems, which differs from in-person teaching, because “it is very easy for teacher to keep talking and interrupt students [during in-person teaching]”.

Setting clear expectations for online etiquette: Joan emphasized the importance of setting firm expectations for online learning etiquette, such as having cameras on during live sessions. She noted, “Obviously, I had issues with connectivity, but having seen students’ faces was incredibly important, so that just like in a real class, you can see if the students are engaged or not sleeping”.

Providing alternative venues for expression and engagement: Online learning offers more opportunities for students with disabilities to express themselves and engage deeply in activities, such as using the chat function on online platforms. Joan shared an example: “I had a student who was on the autism spectrum, non-verbal, so he would literally only speak when he felt it was necessary, and he played a fighter [in game Dungeons and Dragons]. . . every time his character would talk, he would type into the chat, and I noticed that there was a huge difference in the way he played when he was physical with us. . . suddenly he was one of the most charismatic characters in the entire game when online”.

4.3. Theme 3: Challenges in Online Teaching

Impact of home environment: Seven teachers identified the home environment as a significant challenge during remote online learning. Many students lacked adult support and a quiet home. Andy noted that students were often alone or with siblings while parents were at work, making it difficult to focus. Andy added that young students had to ensure their siblings’ safety, often joining classes with distractions. Jessica stated, “It is Math time and but at home, there’s not such that expectation, and if parents are working and nobody

could be there to say, hey, you get your math book out, I can't tell if they have their math book at or not".

Joan observed that students' potential was stifled by their home environment and responsibilities. She said, "When I ask what do you think about this? Alissa (Not real name)'s brother would be right here, just out of shot, and she would nervously look up and see the brother, and I could tell that her answer was stifled because of her exposure to family, especially junior high and high school students, in particular, are very shy". Joan emphasized the importance of accountability, comparing a student with a quiet room and parental control who participated actively to another without supervision who rarely joined. John added that students without adult support were often distracted, preferring video games unless highly interested in the material, which hindered their creativity and potential.

Lack of motivation: Lack of peer interaction, extended family presence, and home distractions reduced students' motivation. Twelve teachers reported low motivation among students for attending and engaging in online classes. Annie commented, "They did not care at all", noting a significant drop in students' effort. Another teacher linked low motivation to stifled creativity, emphasizing the need for personal connection and investment. Ryan observed that students with parental support were more motivated. Mike noted that missing one or two classes made it hard to re-engage students. Lauren remarked, "I would say the greatest challenge with student motivation, and I think part of it was being in a home setting; it is more relaxed and very different, so they weren't real-driven".

Technical issues: Technical difficulties posed significant challenges. Annie mentioned students without internet access. Joan, teaching in a rural area, often missed classes due to connectivity issues and had students who could not join at all. She stated, "Definitely as a rural school teacher student, lack of access to the internet was incredibly tough. ... They were incredible students that were amazing, they logged on to zoom, and their picture would pitch a little bit, and I messaged, 'please, turn your video off, save on the bandwidth.' Or they would message me and say, I'm sorry. I can't watch the film, I don't know what's going on, and that was incredibly tough. So for me, I had to not only come up with a lesson for the students who were there but also a lesson for the students who, for whatever reason, couldn't be there". Annie supported this, noting the challenge of students living in rural areas with poor internet. Technical issues also impacted motivation, as Jessica mentioned that students with internet problems lost motivation after struggling to join meetings.

Uncertainty: The pandemic created uncertainty about teaching practices. Teachers like Kimberly felt unprepared for online teaching, as it was "just kind of thrown". Kurt mentioned the struggle of using emails and Canvas instead of proper online platforms. Melissa added that the situation was like "thrown at you out of the blue", with everyone unsure of what was happening. Terri stated that no one had time to prepare for the unprecedented situation, leading to a rushed and challenging environment. Teachers needed more support during emergency teaching than usual.

4.4. Theme 4: Enhancing Parental Involvement and Emotional Support in Online Learning

Parental training and accountability: As discussed in the challenges section, teachers emphasized the need for parental training to support online learning. Jenny noted that parents could help keep students motivated to attend online classes, but this support was often lacking. She stated, "There's always that want for more family support to make sure that their children are doing what they're supposed to be doing, but families are busy". Joan shared an example of twins in her class, where one was very engaged when alone. John highlighted that students without parental supervision struggled, leading

to poor performance. Mike added, “When they’re e-learning at home, they might have three or four siblings sitting next to them at the kitchen table that are also doing e-learning, and they can get distracted really easily or . . . A lot of times, their parents be working at home too”. Therefore, parental involvement and training are crucial for a better online learning experience.

Providing social and emotional support: Teachers recognized the need for social and emotional support for students in the new online learning environment. Jenny noted that students felt overwhelmed and alone, adding, “[I] would not have wanted to be a student” during the pandemic. Kurt mentioned that students struggled to express themselves at home due to distractions, stating, “They need to be able to express themselves without being afraid. . . so finding a place to do that in the home was a challenge sometimes because of four or five brothers running around, and in the background doing things, it’s hard to be creative or even to work hard when you’ve got a million things in the background”. Mike expressed gratitude for returning to in-person classes and highlighted the importance of being tolerant of students’ mental health challenges. Neil suggested having more interactive activities to support students emotionally. Sam noted that students’ attention spans were limited due to their age and home environment, and Terri claimed that schools did not prioritize mental health support adequately.

4.5. Theme 5: Supporting Teachers and Students in Online Learning

Support for teachers: Teachers outlined the support they needed for better online teaching. They stressed the importance of support from school administration, including building effective accountability systems, providing engaging learning resources, and collecting timely feedback from students. Lauren mentioned, “I made phone calls to 30 students checking up on work is very difficult and it’s kind of hard. . . I feel like anyone could be more accountable for those students and making sure that there was enough time in the day to coach every one of them who are struggling . . . maybe a weekly check in even with them, to make sure that that student is getting those things done because it is hard online”. Mike appreciated administrative flexibility and realistic expectations, which reduced teachers’ burden.

Peer collaboration and resource sharing: Teachers emphasized the importance of peer collaboration and sharing resources. Joan noted, “We are so willing to share and support. . . we learn together. And everybody brought something to the table. . . instead of trying to reinvent the wheel or try to do it myself, I would reach out more and offer things more, share more information to make it easier”. Mike echoed, “being able to use a lot of the other teachers in my school as resources for how did you tackle this problem, how did you make this lesson interesting, how can you make this topic fun? I would really lean on them for support a lot”. Lauren expressed, “I love talking with other teachers and it’s the best quickest form of growth”.

Supporting students with learning disabilities: Addressing the needs of students with learning disabilities is critical for equity in online teaching. Mike highlighted the role of paraprofessionals in supporting these students: “Each paraprofessional [in my school] was assigned a certain number of students, and so then those parents would check in with them, would make sure that they were going to Zoom meetings, would make phone calls home. We talk with parents if they were fun behind, that took a huge load off of me, it made it a lot more bearable to do my job”.

Professional development for online teaching: Teachers stressed the need for effective professional development to tackle the challenges of online teaching. They received training on online learning management systems and technology use. Lauren noted, “Our district offers a lot of professional developments, but I strongly feel like you have to put in the time

to make it worthwhile and more interesting to students". Teachers expressed a desire for more training focused on engaging students online.

5. Discussion

This study explored teachers' online teaching experiences during the global transition to emergency remote teaching, revealing five key themes. Below, we explicitly contrast these findings with prior literature cited in the review to highlight alignment, divergence, and novel insights.

Consistent with Hussar et al. [5] and Khlaif et al. [29], we found that rural internet gaps and chaotic home environments disproportionately impacted marginalized students. However, our study adds nuance: Teachers observed that even students with devices struggled in shared spaces, a challenge overlooked in Ferri et al. [24]. The efficacy of asynchronous lessons for absent students supports Heo et al. [25]'s call for flexible pacing but challenges Sorensen [21]'s assumption that home challenges are insurmountable without institutional intervention.

Teachers' reliance on trial-and-error strategies echoes Pokhrel and Chhetri [31]'s findings on systemic unpreparedness. However, our results highlight a critical divergence: while Dindar et al. [34] attributed readiness gaps to technology access, participants emphasized pedagogical training (e.g., hybrid instruction, UDL frameworks) as the priority—a nuance absent in prior work. This underscores the need for actionable frameworks, as noted in Tsegay [33].

The shift to facilitator roles aligns with Coppola et al. [37] and Ní Shé et al. [38]. However, teachers in our study uniquely emphasized managerial burnout (e.g., juggling breakout rooms and parental communication), a challenge underreported in Gorsky and Blau [39]. The success of text-based participation for neurodivergent learners expands Gwynette et al.'s work on technology-mediated inclusivity by demonstrating its scalability in K-12 settings [51].

While Martin et al. [42] and Coker [44] advocated structured online courses, our findings reveal a tension: overly rigid frameworks stifled creativity, whereas choice-based assignments (e.g., student-led videos) boosted engagement. This supports Mikić et al.'s emphasis on personalization [52] but challenges Peacock and Cowan's focus on uniformity [43]. Parental workshops, though critical, faced barriers (e.g., work constraints) not fully addressed in Balayar and Langlais [53], highlighting the need for tiered support systems.

Our results both validate and complicate existing literature. For instance, while Díaz-Noguera et al. linked autonomy to engagement [54], teachers in our study stressed that autonomy without structure (e.g., undefined choice boards) led to confusion. Similarly, Tawfik et al.'s call for administrative support was validated [55], but we identified peer collaboration (e.g., shared repositories) as an underutilized buffer against burnout. These contrasts emphasize the need for context-responsive policies rather than one-size-fits-all models.

6. Limitations and Further Direction

While this study provides valuable insights into the experiences of teachers during the transition to online teaching, several limitations must be acknowledged. First, the study's recruitment via district-wide mass emails may have introduced selection bias, as participants likely represented teachers with stronger technology access or proactive engagement in professional development. Second, the sample (16 teachers from three Midwestern U.S. districts) lacks geographic, socioeconomic, and cultural diversity, limiting generalizability to other regions or educational systems. Although the sample covers a wide range of grade

levels and subjects, it lacks diversity in terms of geographic location, socioeconomic status, and cultural backgrounds. This limitation restricts the generalizability of the findings, as teachers' experiences with online teaching may vary significantly across different regions and demographics. Additionally, the findings are specific to the emergency transition period at the outbreak of COVID-19, a time characterized by unprecedented disruptions and rapid adaptation to online teaching. The unique challenges and solutions identified during the initial transition may not fully apply to future instances of online or hybrid learning. Continuous research is necessary to keep up with the evolving landscape of online education.

While findings offer nuanced insights into U.S. K-12 teachers' pandemic experiences, the recruitment method and regional focus caution against overgeneralization. Future studies should prioritize diverse, representative samples to validate these results.

Furthermore, findings highlight the necessity of targeted teacher training programs to address pedagogical gaps in hybrid instruction. Professional development should prioritize interactive tools (e.g., Flipgrid, Kahoot), trauma-informed practices, and peer mentorship models to foster collaboration and reduce burnout. Such training must be coupled with family engagement initiatives, including workshops to equip parents with strategies for supporting home-based learning and navigating digital platforms, thereby strengthening the bridge between schools and households.

Finally, the study advocates for inclusive design principles in online education. By leveraging technology's flexibility—such as chat functions for neurodivergent learners or breakout rooms for shy students—educators can create equitable virtual spaces. Universal Design for Learning (UDL) frameworks should guide curriculum development to ensure accessibility for all learners, particularly those with disabilities.

Future research should expand this work by employing mixed-methods approaches to test scalable interventions (e.g., community Wi-Fi hubs) and evaluate long-term outcomes of hybrid models. Geographic and socioeconomic diversity in samples will further clarify how systemic reforms can be tailored to regional needs.

Future research should investigate the long-term impact of emergency remote teaching on student learning outcomes and teacher well-being, as well as explore the development of sustainable and equitable online learning environments for all learners.

7. Conclusions

This study, grounded in the lived experiences of 16 U.S. K-12 educators, highlights the complex realities of emergency remote teaching during the COVID-19 pandemic. Teachers' narratives revealed systemic challenges—such as the “homework gap” in low-income and rural communities, fragmented teacher preparedness, and socioemotional strain on students—that demand urgent action.

Disparities in internet access and home environments stifled engagement for marginalized students. Policymakers must prioritize rural broadband expansion and subsidized devices to ensure equitable participation. Also, educators innovated through trial-and-error (e.g., gamified quizzes, choice boards), but systemic gaps in training left many overwhelmed. Districts should institutionalize professional development in hybrid pedagogy, trauma-informed practices, and peer collaboration to reduce burnout. Additionally, parental involvement emerged as critical for student motivation. Schools must bridge the home-school divide through workshops on digital tools and strategies to foster structured learning environments. Moreover, flexible tools (e.g., chat functions, breakout rooms) empowered neurodivergent learners, but curriculum design must adopt Universal Design for Learning (UDL) principles to ensure accessibility for all.

Moving forward, the pandemic's disruptions underscore the need for resilient, equitable systems. While this study's regional focus (Midwestern U.S.) and recruitment method (mass emails favoring tech-accessible teachers) limit broad generalizability, its findings illuminate universal themes: the centrality of teacher voice, the cost of systemic neglect, and the potential of crisis-driven innovation.

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