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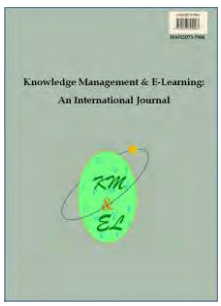

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A case study of South Korean elementary school teachers' emergency remote teaching

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Abstract: COVID-19 is an unprecedented pandemic that has impacted the whole world. The pandemic made researchers and educators realize the critical need to prepare for future disasters. This study explored a context-specific case for elementary online learning where we investigated how elementary school teachers transitioned to emergency remote teaching (ERT) from face-to-face to online learning during the pandemic. A case study approach was used to explore South Korean elementary teachers' ERT approaches and experiences during COVID-19. Using the CIPP (Context, Input, Process, and Product) framework, we sought to understand how the transition occurred from the perspectives of the teachers. The analysis uncovered several themes that fall under each category of the framework. In terms of context, limited technological aptitude and lack of training in online instructional design as well as policy issues and socio-

economic differences were identified as key factors in assessing the current state of the ERT. In terms of input, instructors' efforts as well as support from in and out of school were discussed. Student interaction and engagement were identified as key factors in understanding the process of ERT. Lastly, learning outcomes, instructional strategies, and systemic transformation emerged as products of ERT.

Keywords: Emergency remote teaching; Online learning; Elementary teachers; CIPP

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1. Introduction

In response to the COVID-19 pandemic, many elementary schools worldwide have implemented emergency remote teaching (ERT) to continue teaching/learning activities at home. ERT is "*a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances*" (Hodges et al., 2020). ERT has a clear distinction from well-planned online learning due to minimum resources and scant time for transitioning from everyday face-to-face instruction to online settings. Teachers and school administrators have experienced confusion and difficulties adjusting to the ERT. Major challenges reported by K-12 instructors in ERT are related to issues of technology (e.g., digital divide, learning new technology), social interaction (e.g., lack of student participation and caregiver support), and social well-being (e.g., no work-life balance) (An et al., 2021). School administrators have also expressed challenges with handling the school's unified

regulations and teachers' discretion, insufficient caregiver support for online learning, and the lack of infrastructure for online learning (Aytaç, 2020; Shamir-Inbal & Blau, 2021).

ERT was particularly challenging in K-12 settings since online learning was not widely adopted compared to higher education. Researchers have pointed out that most K-12 teachers are not yet fully trained or prepared to teach online courses (Archambault & Larson, 2015; Kennedy & Archambault, 2012; Moore-Adams et al., 2016). The 2018 Programme for International Student Assessment (PISA) report suggested that most K-12 educational institutions and teachers in OECD countries were not fully ready for online teaching given the lack of skills to teach in an online environment (Shamir-Inbal & Blau, 2021). Before COVID-19, online learning in K-12 focused on at-risk students as a supplement for regular face-to-face courses rather than being offered to all students (Farmer & West, 2019; Germin et al., 2015). As such, the limited use and the low level of preparation for online learning in K-12 have increased challenges for teachers to adapt ERT during COVID-19. These challenges call for a more in-depth assessment of the situation using an analytical framework to explore and uncover different cases of ERT for K-12 education, especially elementary instruction.

Current literature on K-12 online learning is still limited (Harris-Packer & Ségol, 2015; Schwartz et al., 2020; Shamir-Inbal & Blau, 2021). Considering the critical need to prepare for future disasters, this study explores a context-specific case for elementary online learning through the analytical lens of the Context, Input, Process and Product (CIPP) model (Stufflebeam, 2000) to investigate ways in which elementary teachers in South Korea have coped with challenges and opportunities that emerged during COVID-19. South Korea is selected as a case because it is considered a country that successfully tackled the COVID-19 crisis and transferred classroom teaching to online teaching in a relatively early stage of the pandemic.

2. Literature review

2.1. CIPP evaluation model for online learning

The CIPP model suggested by Stufflebeam (2000) is a comprehensive framework for evaluation. Researchers describe CIPP as a macro or system-based evaluation model (Eseryel, 2002; Hew et al., 2004) appropriate for evaluating online education programs. The model is particularly effective in its entirety and usefulness for considering the contexts where a learning or training program is applied. According to Stufflebeam, the CIPP model can provide essential information for decision-making by collecting information about a program's merits. Policymakers and service providers could initiate, develop, or revise programs more effectively and systemically based on four elements of evaluation in the CIPP model (Stufflebeam, 2000).

The CIPP model consists of four elements of evaluation: context, input, process, and product. First, context evaluation refers to assessing and addressing background information regarding needs, assets, and problems in a defined environment. Input evaluation is concerned with assessing strategies, plans, and budgets for the needed work. Process evaluation refers to monitoring the implementation of projects, plans, or activities. Finally, product evaluation assesses the achievements of programs or projects by

determining whether the program objectives have been achieved for the target audience (Stufflebeam, 2000).

According to Rahmaniar et al. (2021), the CIPP model is particularly useful in providing a comprehensive review of the context of the implementation process. Further, the model has the potential to improve the targeted programs or projects through formative and summative evaluation. While the model has its disadvantages – such as placing too much emphasis on how the process should be rather than recognizing the complexity of the empirical reality due to the managerial nature of its approach (Rahmaniar et al., 2021) – we chose the CIPP model because the ultimate purpose of this research is to explore the important factors that impact the success or challenges of the whole ERT process. Thus, using the CIPP model, our research aims to provide educators and administrators with useful information to manage ERT with improved strategies and behaviors in future catastrophes.

The CIPP model has been used to evaluate educational programs in a variety of settings, including nursing education programs (Lippe, & Carter, 2018), language learning programs (Agustina & Mukhtaruddin, 2019), and self-learning curricula for kindergarten (Al-Shanawani, 2019). This model has also been used to evaluate and redesign online or blended learning programs (Ngala et al. 2019; Thurab-Nkhosi, 2019; Tokmak et al., 2013). More recently, some studies have adopted the CIPP model to evaluate ERT (Mohmmed et al., 2020; Thurab-Nkhosi et al., 2021). In our study, we applied the CIPP model to explore and assess the ERT process, experienced by South Korean elementary school teachers during the COVID-19 pandemic.

2.2. Research on emergency remote teaching during disasters

Researchers have suggested guidelines and strategies for conducting ERT in crisis situations (Laprairie & Hinson, 2006; Rush et al., 2016). Emerging research also discussed contextual factors and effective approaches for ERT in elementary education during COVID-19. Our work builds on existing ERT guidelines and case studies of ERT during COVID-19 to understand important conditions related to context, input, process, and product for the ERT framework for future disasters. Two ERT guidelines, which were developed for disasters before COVID-19, are particularly useful to consider. Laprairie and Hinson (2006) suggested the Connecting Education Online in Louisiana (CEOL) model could be adapted as a prototype for ERT in the event of a disaster. The model emphasizes the importance of establishing infrastructure – including internet services, computer devices, teacher training, and parental involvement – and the effort required to sustain the model. Laprairie and Hinson (2006) also proposed that various groups, including business leaders, nonprofit organizations, school districts, and universities, need to cooperate to address the disruption to education in the event of a disaster. Next, Rush et al. (2016) suggested five stages for the rapid construction of ERT after a disaster: (1) evaluation of school operations and community needs; (2) checking key considerations for each phase of development and implementation, including the establishment phase (e.g., developing the basic infrastructure for ERT), the active phase (e.g., facilitating the ERT community), and the maintenance phase (e.g., soliciting feedback and implementing necessary changes); (3) garnering available resources and supports; (4) informing the key elements of the ERT plan to students; and (5) executing and maintaining the ERT plan. Consequently, we consider how elements suggested by Laprairie and Hinson (2006) and Rush et al. (2016)

were reflected in the experience of ERT in South Korea and what additional elements need to be considered for successful ERT.

Several educational studies during COVID-19 showed contextual factors of each country influenced the degree of readiness for ERT. For instance, countries with existing online educational content providers could deliver timely online lessons. Turkey established an e-content portal called Educational Information Network/Eğitim Bilişim Ağı (EBA) that provided digital educational content such as videos, educational software, and games to all students for free (Erümit, 2020; Ocak & Karakuş, 2022). When the pandemic occurred, the Turkish Ministry of Education used the existing EBA platform to provide an artificial intelligence-based EBA assistant to answer students' and parents' questions regarding online education. South Korea also provided distance learning content via Educational Broadcasting System (EBS), which allowed students to access high-quality educational content on TV during quarantine (Byun & Slavin, 2020). South Korea also benefited from the high-speed Wi-Fi network that was already widely utilized across the nation. In China, the government launched an integrated collection of open teaching resources in early 2000. Since 2019, this national project gathered high-quality online teaching resources from more than 2 million teachers and created over 3 million online courses and 8 million teaching resources. During the COVID-19 pandemic, these resources were successfully utilized to support ERT (Zhou et al., 2020; Zhou & Li, 2020). Furthermore, China Education Television Channel 4 (CETV) provided recorded courses to all grade levels. These courses were broadcast to all regions, including rural areas with no cable TV or slow internet connection (UNESCO & UNICEF, 2021). In addition, teachers at elementary schools used various social and communication platforms (e.g., QQ, WeChat, DingTalk, Zoom, Xiaoyu, Seewo, and Xueleyun) for ERT (Zhou & Li, 2020).

On the other hand, the United States took a more decentralized approach. Most K-12 teachers independently adopted and used digital platforms or resources for ERT at their discretion. Francom et al. (2021) confirmed that K-12 teachers in the United States reported a lack of school/district guidelines for ERT. However, the teachers used various digital platforms for ERT, and the majority of the tools were already familiar to them because they had used them before the pandemic.

Many studies showed that choosing an effective online platform and providing easy-to-access educational resources were helpful for ERT. Although the choice of the online platform differed by each school, many schools chose an online platform that was stable and familiar to students and caregivers (Basilaia & Kvavadze, 2020; Kong, 2020; Rasmitadila et al., 2020). In many countries, educators provided instructional content by leveraging existing platforms or content that were publicly available. For instance, an interview study with 53 teachers in Latin American and Caribbean countries showed that teachers often used instructional videos from YouTube (Gentles & Brown, 2021). In Turkey, additional resources for families such as virtual museum trips or book archives were provided by the EBA to support the learning needs during the unprecedented situation (Erümit, 2020).

Current ERT literature during COVID-19 shared challenges experienced by teachers, students, and caregivers, such as lack of online teaching experience, difficulty in maintaining student engagement, variabilities in family, and differences in technological infrastructures. Many teachers experienced a lack of self-efficacy with online tools and experienced classroom management to be particularly challenging as students could easily engage in non-academic tasks online (Putri et al., 2020; Rasmitadila et al., 2020). For

instance, Leech et al. (2022) examined the ERT experiences of K-12 teachers in a western state of the United States through a survey. Many teachers had difficulties in getting students to engage and participate in courses (30.1%), connecting or making close relationships with students (20.7%), and adjusting curriculums or teaching practices to an online environment (12.9%). Zhang (2020) also investigated the ERT experiences of K-12 teachers in China during the pandemic. According to this study, primary and secondary school teachers reported difficulties in monitoring and motivating their students during ERT.

Other challenges for teachers included improving their skills to integrate online resources and digital tools for online teaching (Kong, 2020; Shamir-Inbal & Blau, 2021). Cheng (2020) reported that teachers in China had difficulties in communicating with parents as well as students to facilitate parental support and cooperation for ERT. The lack of technological infrastructure was one of the most difficult challenges. The Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) reported that only 5% of local government schools implemented synchronous online learning while most schools relied on paper-based materials during the school closures caused by COVID-19 due to a lack of equipment (e.g., laptops, tablets) to lend to families in need (Duggan et al., 2021). Several studies reported that differences in families' financial backgrounds exacerbated the differences in students' motivation and engagement. A stark contrast was visible between the students who had caregivers or tutors to support them with online learning at home and those who did not even have the devices and internet access to participate in ERT (Byun & Slavin, 2020; Putri et al., 2020; Rasmitadila et al., 2020; Sharma, 2023). Relatedly, Horowitz and Igielnik (2020) found that 72% of lower-income parents in the United States were very or somewhat concerned about their children falling behind in school while 55% of upper-income parents were concerned about this. For this reason, considering how to address and mitigate students' contextual factors was an essential task for ERT.

Students also experienced various challenges during ERT. According to Yan et al. (2021), K-12 students in the Guangdong Province of China reported struggling with eye strain caused by staring at the screen for a long period of time (approximately 70%), disengagement caused by nearby disturbance (approximately 40%), and the slow internet connection (approximately 50%). In the United States, Cockerham et al. (2021) examined the changes and concerns of K-12 students (12-17 years) during the pandemic. They found that the majority of participants struggled with distractibility during online learning (71.4%). Furthermore, most students (66.7%) reported feeling the need for social interaction and not having enough opportunities for social connection through online learning.

Several areas of consideration were suggested that could potentially provide essential conditions for ERT. First, the importance of developing teachers' competency for online teaching was reported. Dolighan and Owen (2021) showed that teachers' highest online teaching efficacy scores correlated with prior experience in taking additional qualification courses and professional development (PD) sessions. Another study suggested that stimulating teachers' interest to continue teaching in online settings may be an important factor to consider in PD sessions (Panisoara et al., 2020). Based on a survey with 980 in-service teachers in Romania, Panisoara et al. (2020) illustrated that teachers' higher self-efficacy in technological pedagogical knowledge supported them to continue teaching online. Other studies also emphasized the readiness of teachers to teach online as key to successful ERT (Fauzi & Khusuma, 2020; Putri et al., 2020; Rasmitadila et al.,

2020). Also, multiple studies highlighted the critical role of institutional and caregiver support (Panisoara et al., 2020; Rasmitadila et al., 2020). The institutional funding to support teacher training and prepare learning facilities was important to enhance teacher enthusiasm to continue with online learning (Rasmitadila et al., 2020). Scholars also commented on the importance of considering caregivers as critical stakeholders in the educational ecosystem and suggested providing various educational resources that caregivers can utilize at home to connect with children's interests (Erümit, 2020; Rasmitadila et al., 2020). Finally, a recent systematic review of remote teaching strategies involving the use of technology during emergencies from 2010 to 2020 by Crompton et al. (2021) suggested future educators to consider a variety of physical, cognitive, spatial, and infrastructure resources for teachers and students during the planning of ERT and to explore potential partnerships with outside organizations to provide digital and internet-based resources to students who may lack them to engage in ERT. Communication at multiple levels with other teachers, students, parents, and the community was encouraged.

While there is research on ERT in elementary education during disasters, only a few studies to date have provided a comprehensive framework on how to transition elementary instruction to online settings during disasters. By framing and assessing in-service teachers' COVID-19 ERT experiences with the CIPP model, this study seeks to identify and outline factors related to context, input, process, and product that educators can consider for future ERT. Specifically, we ask the following research questions:

RQ1: What challenges, especially related to learning goals, student and teacher needs, and technology implementation, did teachers face in transitioning from face-to-face to ERT?

RQ2: What internal and external resources did teachers utilize to address student needs and learning objectives of ERT?

RQ3: What instructional strategies did teachers implement for ERT?

RQ4: What were the various learning outcomes of ERT initiatives, and how can these outcomes inform ERT needs in the future?

3. Method

To explore South Korean elementary teachers' ERT approaches and experiences during COVID-19, this study used a case study approach (Hamilton & Corbett-Whittier, 2012). A case study involves an in-depth analysis of individuals to gain a holistic view of the research problem. In particular, a case study is useful to identify and explain research contexts and underlying phenomena related to a research question. Given that this study aimed to develop an ERT framework, we employed a case study methodology to add to the existing literature by exploring South Korean teachers' in-depth experiences of ERT during the pandemic.

3.1. Context and participants

Six South Korean elementary school teachers participated in the study. We purposely sampled the teachers who experienced ERT as a full-time class teacher in a metropolitan city and its suburb in the southeast area of South Korea because this region was one of the most highlighted areas during the COVID-19 outbreak that occurred in early 2020. We

also chose classroom teachers because they have more leeway in making instructional decisions and strategies compared to subject teachers. After sampling participants, we interviewed them in February 2021; given that February is the end of an academic year in South Korea, the teachers were able to share their ERT experiences during the COVID-19 outbreak. The selected teachers taught different grades. Table 1 demonstrates study participants' profiles (i.e., demographic information, teaching experiences, class profiles, device/software settings experienced, and backgrounds in using educational technology) collected for this study. All teachers worked at different schools – some located in urban areas and others worked near suburban areas. The teachers interviewed for this study had similar infrastructure in terms of devices/software, but their backgrounds in using educational technologies in schools varied. Each teacher in the study participated voluntarily and signed a consent form to confirm their understanding of the research and its procedures. The researchers informed the teachers that their personal information and participation records would be kept confidential by following the approved institutional review board standards of the research. Before conducting the interviews, verbal consent was obtained again from each teacher.

3.2. Data collection and analysis

Individual semi-structured interviews (approximately 65-100 minutes) took place via *Zoom* by two researchers per interview. The interview protocol (see Appendix I) was developed through multiple research meetings guided by the four elements of the CIPP model (i.e., context, input, process, product). We revised the interview protocol until a consensus was met. In addition to pre-defined interview questions, the researchers occasionally used probing questions to elicit the participants' detailed and clarified responses. The interview sessions were conducted in Korean and were video and audio-recorded. We then used an automatic Korean speech-to-text transcribing tool *CLOVA Note* (Ha et al., 2020) to yield all text records. An extra transcriber and the researchers validated the transcribing results in text. All the researchers were fluent Korean speakers; hence the data were analyzed in Korean. However, excerpts presented here have been translated. In addition to interview records, the researchers of this study occasionally asked teachers to share their ERT-related archives during the semester. For example, online tools used in ERT, screenshots and anonymous student drafts during ERT activities were shared during the *Zoom* interviews. All collected data from the teachers were used as supplementary resources for data triangulation.

We developed a coding scheme based on the four elements of the CIPP model (Stufflebeam, 1966, 1983) (see Table 2). All researchers independently coded 20% of the interview transcripts with a developed coding scheme. The researchers then cross-checked independent coding records to yield reliable results. When there was a discrepancy between the two researchers' coding results, we reached a consensus by iterative discussions.

4. Result

4.1. Context

When schools initially transformed to ERT, teachers faced various internal and external obstacles. Internal obstacles related to teachers' limited technological aptitude in online

teaching and lack of training in online instructional design. External obstacles related to issues of digital divide and socio-economic disparities.

Table 1
Study participants' profiles

Participant	Gender	Teaching experiences	Class profile	Device/software settings experienced	Backgrounds in using educational technologies
Teacher 1	Female	4 years	5th Grade 25 students (Male = 12, Female =13)	Social media, digitizers, and an interactive media board	• Interested in testing technologies (e.g., social media, digitizer, and an interactive media board) • Voluntarily joined an emergency team that urgently developed educational media in response to teaching during COVID-19 (e.g., videos with a lesson plan for remote learning) • Identified himself as technology-savvy
Teacher 2	Male	15 years	6th Grade 23 students (Male = 12, Female =12)	Electronic blackboard, webcams, and microphones	• Routinely integrated interactive and immersive media (e.g., games and virtual worlds) into classroom teaching • Received several awards from educational media contests • He took part in a leadership role in investigating the optimized applications of required devices for remote teaching
Teacher 3	Male	11 years	6th Grade 23 students (Male = 12, Female = 11)	A digitizer with a tablet, webcams, screen recording software, and PowerPoints	• Although he was not initially motivated by technology use first time, he was flexible in adapting his classroom formats using various devices tailored to ERT during COVID-19 • Was in charge of providing information technology services (e.g., purchasing educational media and devices) for peer teachers • The school is located a bit far from the central district zone and the class size at the school is larger than the central area of the district • The students in the school show low socioeconomic status
Teacher 4	Female	12 years	4th Grade 24 students (Male = 13, Female = 11)	Webcams, screen recording software, audio recording tool, PowerPoints	• No prior experience in online class management, video conferencing tools and supporting devices • Took a leave of absence from work for four years and came back last year • She experienced a particular challenge when managing a learning management system that delivers learning materials and evaluation items
Teacher 5	Male	13 years	4th Grade 28 students (Male = 15, Female = 13)	A digitizer with a tablet, a visual presenter, and laptops	• No prior experience in using online classes • Only participated in informal online communities to share teaching/learning materials • Instead of synchronous online classes, provided pre-recorded video streaming during the COVID-19 pandemic • The school is located far from central metropolitan areas, and he felt limited in his access to technical support from the local office of education in the district
Teacher 6	Female	12 years	2nd Grade 28 students (Male = 14, Female = 14)	Tablets, webcams, microphones, a visual presenter, school website	• No prior experience using online platforms for classroom teaching • Used web pages to inform students about classroom assignments

Table 2
The coding scheme developed for this study

Category	Category definition	Literature (Stufflebeam & Shinkfield, 2007)	Sub-category	Sub-category definition
Context	Situations, regulations, requirements, and demands of students, caregivers, administrators, and teachers themselves	Planning decisions by identifying unmet needs, unused opportunities and underlying problems that prevent the meeting of needs or the use of opportunities	Internal factors	Limitations and difficulties faced by the instructor during emergency situations prior to starting the online education
			External factors	Demands from external parties • District Administration • School Administration • Parents
Input	Teachers' instructional strategies and schools' support	Structuring decisions by projecting and analyzing alternative procedural designs	Individual effort	Individual efforts to consider during the emergency situation
			External support	Support from external parties • Material/Technological Support • Moral/Motivational Support
Process	Teachers' experiences with students	Implementing decisions by monitoring project operations	Perceived learning process	Extent of learner engagement and participation
			Perceived instructional process	Implementation of learning strategies
Product	Teachers' perceptions and reflections about ERT	Recycling decisions by determining the degree to which objectives have been achieved and by determining the cause of the obtained results	Learner achievement and satisfaction	Learner achievement and satisfaction (recognized by teachers)
			Instructor reflection	Change in instructor's attitude or expectation, capacity, competency, skill, etc.
			Environmental transformation	Change in external support, policy, etc.

4.1.1. Limited technological aptitude and lack of training in online instructional design

Many teachers expressed uncertainty and confusion due to limited technological aptitude and lack of prior training in online instructional design. This was reflected in Teacher 5's remark:

> *"The most difficult thing was that I felt confused because this was my first time. Next, it was difficult for me to teach the class the way I wanted to teach."[Teacher 5]*

A fully online teaching experience was entirely new and unexpected for many teachers. While they had exposure to different learning technologies prior to COVID-19, it was limited to using the Internet for some of the assignments in class. Online learning was fully implemented after the COVID-19 outbreak due to emergent circumstances.

> *"I really started doing (online) classes since last year. Come to think of it, before 2020, it was at the level of utilizing the internet for classes. I did the actual online, remote classes starting last year."[Teacher 4]*

However, not everyone had the same level of difficulty. The level of familiarity with learning technologies influenced teachers' confidence and preparation. Teacher 2 was

exceptional in this aspect, as he took the pandemic as an opportunity to try a new mode of learning. Teacher 2 saw that change was inevitable with or without COVID-19.

> *"While I think COVID-19 was a big crisis, I also think of it as another opportunity, and I thought it was a matter of time to have this shift to online learning. I think this was a very good opportunity that came because of COVID."[Teacher 2]*

As such, the initial response to online learning varied by teachers' level of familiarity with learning technologies and their technological aptitude.

4.1.2. District/school policies, digital divide, and socio-economic disparities

Policy-related obstacles impacted the initial execution of ERT during the pandemic. The bureaucratic nature of educational policies slowed things down, leaving teachers with less time to cope with new online learning environments. The severity of the pandemic shifted the direction of the central government, and the teachers had to wait until the instructions on policies passed through the local government, the school district, and then the school administrators. Teachers were left clueless until the policy-related decisions were relayed to the public. While challenges stemming from policy changes may structurally differ by country, it is still worth considering the potential logistical challenges that policy implementations may cause.

> *"First, we had to resume classes in March, but because of the severity of the situation due to COVID-19, it kept being postponed… So when the government announces via broadcasting, "We will postpone the start date of school to March 16th", we would wait until March 16th…But then, it would keep getting postponed… I only learned about having online classes in June (right before resuming classes)."[Teacher 4]*

There were also issues of digital divide among students and between schools. The sudden transformation of learning mode left students unprepared in terms of computing equipment; and, frequently, students without such support had to rely on parental support or the school's provision. However, in some districts, even schools had difficulty providing the optimal solutions for students who were less equipped.

> *"Some families with parental support had laptops and all, but there were students who only had access to mobile phones. You know how Google (Android) might be difficult (to access online classes). So there were some students who came to the school and did the online learning in the classroom… I was teaching upper grade students, so everyone had smart phones except for one. But since phones have small screens, there three students who loaned (laptops) from school."[Teacher 1]*

Such shortcomings not only impacted individual students but also impacted the mode of instruction. Even though ERT was fully implemented, some students still had to come to school to do online learning. Moreover, the lack of budgets for learning technologies led to the adoption of fewer interactive approaches in online learning. Consequently, teachers shared that early online teaching primarily involved a unidirectional mode of learning.

> *"When the instruction came to do synchronous learning, there was a clash between the national school teachers and the school district office. 'How can we do it? We*

don't want to do it.' It probably wasn't, 'We don't want to do this'. It was more like, 'We don't have equipment. Students are not ready.'"[Teacher 2]

4.2. Input: individual and external resources

In addition to contextual factors, teacher's continuous troubleshooting efforts as well as support from in and out of schools were utilized as individual and external resources to address students' needs and learning objectives of ERT during the pandemic.

4.2.1. Teacher's continuous troubleshooting efforts

While technological and interactivity issues prevailed when teachers delivered online instructions, teachers' continuous troubleshooting efforts helped to resolve interactivity issues caused by students' inexperience with online learning. In the excerpt, Teacher 3 shares his experience of troubleshooting efforts. Having 23 students in synchronous sessions was difficult for both teacher and students due to the novelty of it. Continuous troubleshooting efforts enabled both students and the teacher to adjust to the situations resulting in smoother delivery of teaching.

"First, all 23 students need to be connected to do bidirectional online learning, but if someone doesn't come… One time, this happened. One of the students was like, 'Internet is not working. Wi-Fi signal is weak.' If this is a face-to-face situation, I can just tell the other students do something else while I resolve the issue. But this isn't something I can immediately resolve. If I talk on the phone one-on-one with him or chat with him, other 22 students would be abandoned. So I didn't know what to do during those situations… At first, I was so busy adjusting. After a while, students and I adjusted to the system's pattern so I began to understand what online learning is, what to do, and what to change. I began to think that I can apply things even after COVID-19."[Teacher 3]

4.2.2. Support from school, parents, and the other teachers

Support from school, parents, and other teachers also mitigated the obstacles. As mentioned in the previous section, lack of resources and teachers' technological experiences was one of the main obstacles. Given that ERT was an unplanned emergency situation, teachers initially did not have many resources to receive support. Many teachers shared that they formed peer groups to help each other design the online content. School districts also gathered resources created by teachers and distributed them through a public repository, which enabled teachers to spend less time creating resources and focus more on planning for more interactive sessions.

"We got a room to breathe when (school district) developed contents. We were able to use them during (asynchronous) content-based classes, and we could research more about the curriculum for bidirectional (synchronous) classes and provide it to students."[Teacher 4]

School districts are also provided with more technological resources. Teacher 3 shared that budgets were executed earlier than usual to provide resources for both teachers and students in their district after identifying the technological needs of the students and teachers.

> *"In March of last year, we were given specific instructions to acquire remote learning equipment earlier than usual. The budget was allocated at that time, ensuring immediate availability, and it was even increased. Our school typically serves many students from economically disadvantaged backgrounds. Every May, the government identifies students lacking digital resources and provides support for internet usage fees, distributing devices like smart gadgets to households. However, due to the urgency of COVID-19, we received a notice in March to expedite this assessment process."[Teacher 3]*

4.3. Process

Students' engagement in the ERT activities varied based on students' personalities and preferences. As teachers reflected on their perceptions of students' learning and instruction, it boiled down to the social interactions and engagement between teachers and students. Students and teachers alike experienced fatigue due to long online sessions and experienced communication challenges. On the other hand, some students felt empowered due to the different modes of study. Consequently, participants experienced various challenges related to the lack of interaction and engagement in online settings (see Table 3). We present examples of these challenges and strategies that study participants implemented.

4.3.1. Challenges in the lack of interaction and engagement

Students' engagement in the ERT activities varied. Teacher 2 mentioned that long online sessions distracted students' attention when the novelty effect wore off.

> *"It was kind of refreshing at first, but as students got used to it, I have witnessed students not participating in communications… Doing the online classes for six straight hours was very tiring."[Teacher 2]*

Moreover, some students experienced challenges expressing themselves because of limited social cues. Having a layer of extra technology led to a disconnection between the teachers and the students. Teachers felt similarly. Teacher 4 mentioned that they had a hard time engaging at a deeper level. The unavailable social cues prohibited teachers and students from building rapport. They felt that such a mode could not be something permanent.

> *"The computer felt like a wall to me in communicating with students and building rapport."[Teacher 4]*

Some teachers taught both online and face-to-face students simultaneously, and it hindered them from focusing on either group of students. There were also some positive effects. Several teachers mentioned that some students who had difficulty concentrating in face-to-face learning settings engaged more actively in online learning settings when the use of technology empowered them to express themselves in different modes. In fact, students who were less active in face-to-face settings, but familiar with online interactions, became more active during online learning. In this case, the online learning environment became a new playground for different interactions that were previously nonexistent in physical classrooms.

"There was a student who was very quiet at school but who eagerly participated during online classes. The reason why the student had high interests was that the student knew how do utilize (technology). The anonymity and freedom of the online environment enabled the student to do things freely."[Teacher 1]

Table 3
Challenges related to lack of interaction and engagement

Challenges	Examples of challenges	Strategies that teachers implemented
Maintaining students' focus and participation	Students' passive participation (e.g., turning off screen)	• Start the day with stretching, playing games, or simple sports games as warm-up activities • Provide constant encouragement • Use of online avatars to build online identity
	Difficult to express feelings due to limited social cues	• Use of emoticons and chat functions to express feelings and send private messages to teachers when help is needed • Use of the "raise hand" feature
Online class management	Unable to provide direct guidance when students experience technical difficulties or forget their online ID and password	• Set aside a separate time to teach students about digital literacy skills • Ask parents to help their children to be ready for online classes (especially for lower-elementary grade students)
	Unable to provide direct guidance when students are distracted or lack participation (e.g., showing pets, playing games, watching YouTube or games)	• Spend time to establish ground rules, learning attitudes and habits in online settings • Discuss the importance of netiquette with both students and parents
Transitioning the physical experience to online settings	Difficult to replicate the same level of participation and similar types of instructional activities in online settings	• Integrate educational technology in the curriculum to provide active learning (e.g., Padlet, Google Classroom, Digital board, Minecraft, Augmented Reality applications) • Open up the space for students to recommend digital tools and applications • Integrate research activities that require students to access the internet to conduct independent research on a topic during class time and discuss it as a whole group
	Difficult to engage in large-group discussion	• Use of small group discussion (use of random pairing or small group of two or four students) • Ask students to provide feedback on online assignments and prompt feedback and follow-up interaction among students
	Difficult to teach courses that require hands-on learning and tactile and auditory feedback (i.e., music, art)	• Offer a contactless drive-through for students to pick up "take-home kits" for courses that require hands-on learning • (For upper elementary students) Ask students to upload a video of themselves playing an instrument instead of playing it in front of the teacher to receive a grade

4.3.2. Coping with technical issues and their impacts on instruction

Throughout the instructional process, there were technical issues experienced by the teachers. Some of the issues were resolved, but some issues could not be immediately addressed. For instance, a centralized e-learning system called Cyber Learning System which is used by all Korean schools faced server issues at the beginning, and this became a hindrance to one of the teachers.

"Even at the beginning when we started content-based (asynchronous) class, the server for Cyber Learning System was too overloaded so at the beginning, kids were mentioning that the system is not working. Cyber Learning System fixed it really quickly. Then it was the second semester. Cyber Learning System went through a renewal of learning contents… There were many kids who could not login. So

because of this error, kids were unable to come to the bidirectional class."[Teacher 4]

Even without the server issue, logging into the system was a problem for some students.

"The process of kids knowing their account and entering password took too much time. For us (teachers), the process ends in a few seconds, but students forgot their login ID in a week. Since it is difficult for kids to login, I only gave them links without logging in, and the class format became too difficult."[Teacher 1]

Maintaining the sign-in of students and checking attendance were also related issues.

"For instance, (I wish there was a way to) reconnect automatically when someone got disconnected… It was difficult to check attendance."[Teacher 6]

As illustrated, the technical issue of logging in, accessing information, and maintaining access impacted teaching. Another issue mentioned was in regard to microphones. Having too many students interacting simultaneously led teachers to use a different approach to interaction.

"Yes, chatting. At first, I tried using microphones, and then the different students kept talking. So it became difficult for me to carry on. So I did a training where everyone turns off their microphones and only using the chat function. If someone wants to speak up, then they could use the raise hand icon, and then all 24 students can response via chat."[Teacher 4]

Most of these technical issues were minor, but they still impacted teachers' instructional process which wore teachers down.

"We had to push through without any instructions last year. That was very difficult for me. I had nothing, but still I had to become a pioneer. So we were also learning one by one and had to teach the kids what to do… I spent too much energy figuring out how to use this technology even though I am a person who needs to research how to make teaching fun. So it was very difficult."[Teacher 4]

4.3.3. Strategies for improving student interaction and engagement

Facing a lack of student interaction and engagement, teachers started to apply their own strategies to facilitate interaction and more active engagement in online learning. The strategies they used can be categorized into three different approaches. First, the teachers adopted soft skills used in face-to-face courses to improve student interaction and engagement in online learning. For example, teachers introduced warm-up activities, such as stretching or playing games, and assigned students to groups randomly.

"First, I randomly assigned students into breakout rooms, and students were excited about who will be in the same group… We would warm up in the morning by playing games like 'initial sound game' before class. Sometimes we would do exercise or stretching before the first period, and when students become active, then I would start teaching again."[Teacher 1]

Second, the teachers integrated various Web 2.0 tools to create a more student-centered learning experience. Specifically, some teachers responded that they used tools or

programs (e.g., Padlet, Google Docs, Digital Board, or Minecraft) in conjunction with a primary synchronous digital platform to provide more active and collaborative learning experiences in the online environment.

> *"Our class used Google Docs in Google Classroom. That way, we could do collaborate work by group."[Teacher 1]*

> *"Do you see Padlet here? If the students upload it like this, I would comment, and other students would heart it or like it."[Teacher 5]*

> *"I think simply using webcam and conference platform and then giving out assignments and collecting them to be one-dimensional. I think such platform has limitations in worse situations… So I created this virtual classroom."[Teacher 2]*

Teacher 2 described how he tried to reproduce various activities used in face-to-face courses to make the online learning environment as similar as possible to the traditional classroom through the integration of effective tools.

> *"I tried not to differentiate offline class and online class. I thought they were the same. I tried my best to transform offline activities we did in the past to online activities."[Teacher 2]*

Notably, some students took on more active roles as collaborators or advisers to their teachers once the decision to integrate useful and appropriate tools had been made. Students with high digital literacy often recommend a particular digital tool to their teachers.

> *"There was this app we used in art class during 1st semester that creates stop motion animations… I would study the app and teach students how to use it…some students who are familiar with these apps would say, 'Teacher, this app is better.'… There are students with excellent skill sets beyond our expectations."[Teacher 3]*

Finally, several teachers emphasized the importance of netiquette for encouraging students to be more responsible for their participation in online courses and better prepared for communication and interaction in online learning environments. In addition, the teachers shared netiquette with parents so they could help their children be more ready for online courses.

> *"Since they were joining class from home, some students would wake up just before and lie down while listening… I would clearly announce class rules and appointment during the beginning."[Teacher 1]*

> *"I contacted parents separately to help them focus during class…"[Teachers 3]*

4.4. Product

Teachers perceived those students experienced different levels of learning outcomes in ERT activities. Further, ERT provided an opportunity to develop new instructional strategies and undergo a systemic transformation at schools.

4.4.1. Learner outcomes

Teachers recognized both positive and negative learners' achievement and satisfaction. Several teachers were optimistic about students' long-term learning outcomes that were not anticipated beforehand, such as improvement of information and digital literacy skills.

> *"We will have to test, but I think their information aptitude has gone up, and I believe that it will be a big asset for them when they become adults."[Teacher 2]*

> *"Some students went to YouTube, Naver [Korean search engine], searched for movies and background music. They were utilizing various types of resources so I realized they can do a lot."[Teacher 1]*

However, one of the negative outcomes that many teachers shared was the widening gap between students with high self-motivation and previous online learning experiences with those who lacked them. Teachers mentioned that students with adequate technology at home and previous experience of online tutoring through private institutions were more self-motivated and could perform well in online settings.

Moreover, individual differences and lack of social interactions influenced the level of learner achievement and satisfaction, which had both positive and negative impacts. For instance, individual differences between students helped some students to be more susceptible to online learning while others fell behind.

> *"I cannot say anything definitive about student satisfaction because this is not based on an experiment with control group, but I think students who already had challenges in in-person setting experienced more difficulties in online settings which probably widened the gap between the two."[Teacher 4]*

> *"Some of the female students who are shy but can concentrate and write well showed extreme progress during online learning, but for students who are active and like to physically play around with friends and the teacher, the progress dropped extensively. For them, this was too frustrating."[Teacher 2]*

Also, teachers mentioned that fewer social interactions in online settings made it challenging for students to maintain focus. However, on the positive side, teachers expressed that synchronous classes with instantaneous feedback were more effective than asynchronous classes.

4.4.2. Instructional strategies and systemic transformation

Some teachers saw a glimpse of future education through this experience. Teacher 5 mentioned that they foresee the future education becoming different post-covid. While the online learning experience removed some of the fantasies about future education, teachers still saw online learning as a new opportunity to supplement and enhance the current classroom.

> *"I don't think we can go back to the time when we had no (online learning), but I also think that fantasies about the future education are gone now. I think it's the same for the students as well. Students and the parents alike."[Teacher 5]*

5. Discussion

This study uncovered several factors that could influence the success of ERT. The interactivity of the whole learning environment greatly affected students and teachers. Also, because this was an emergency situation, learning was heavily impacted by the technological aptitudes of instructors. Hence, support from external parties such as schools and parents was critical. Regardless of how online learning panned out, there were limitations. The attention span of students and physical activities were limited. Multiple modes of instruction and uncertainty of instructions were also part of the limitations. Often, online learning relied too much on specific individuals (e.g., technologically savvy teachers) which made it difficult to sustain the quality of instructions. These limitations align with other studies that concluded that first-time remote teaching and learning experiences often led to more frustration and stress in ERT for both teachers and students (Stewart, 2021). Despite these challenges, there were also benefits from such transformation. First, a quick transition somewhat forced teachers to try new technologies that could be used even after the pandemic. It also boosted instructor confidence and provided a new vision for systemic transformation. These benefits align with the cases of other countries as teachers from Chile (Sepulveda-Escobar & Morrison, 2020) and Saudi Arabia (Alqurshi, 2020) also experienced being forced to use new technology and new teaching methods, which resulted in creating comfort zones for trials and experiments with lower risks. Also, teachers in our study were able to discover a new group of emerging learners who were often less noticed during face-to-face learning but who became more active in the remote setting. While previous studies mainly highlighted the challenges and benefits directly from using technology (e.g., Choi et al., 2021), our findings recognized the potential of ERT as a tool for teachers to better understand individual students' characteristics and patterns of learning.

Through the study, we sought to understand how the aforementioned factors fall under the category of the CIPP model. We present the key factors that mainly influenced the ERT practices of elementary teachers in Korea through the analytical lens of the CIPP model (i.e., context; input; process; and product). By identifying what factors played a central role in each category of the CIPP model, we sought to provide the most critical factors in delivering optimal instruction during ERT situations.

As demonstrated in previous studies (e.g., Byun & Slavin, 2020; Crompton et al., 2021; Erümit, 2020), contextual factors impact the readiness of ERT. As such, it is crucial to identify and assess the obstacles that may hinder the successful execution of ERT during the crises. Both internal and external obstacles were critical in evaluating the current *context* of the ERT situations. The key internal obstacles that emerged were related to the technological aptitude of instructors and training in instructional design. The external obstacles mainly stemmed from policy issues and socio-economic disparities/digital divide. The findings demonstrate that properly identifying both the instructors' aptitude and the societal surroundings of the environment is critical in fully understanding and assessing the ERT environment.

Therefore, surveying to assess instructors' technological aptitude and instructional design skills and identify socioeconomic disparities among students is imperative. Also, a survey of students' access to digital devices and technological readiness should be performed. By assessing the current situations and identifying obstacles, the schools can prepare for ERT more effectively, secure a sufficient budget to support digital devices and resources, and confirm what supports are needed from other educational stakeholders such

as parents, administrators, and policymakers. Our findings on *input* were related to teachers' efforts and support from in and out of school. Similar to what is discussed in *context,* this demonstrates that both internal and external efforts are critical in properly executing ERT. While individual efforts from the instructor would directly influence the quality of instruction, such efforts are heavily influenced by support from in and out of the school. Studies highlighted the importance of providing a platform for facilitating the ERT community to provide educational content, solicit feedback from multiple educational stakeholders (e.g., students, and parents), and provide additional resources that students can engage at home (Erümit, 2020; Rush et al., 2016). Several studies emphasized choosing a platform that is easy to access and familiar to learners (Basilaia & Kvavadze, 2020; Kong, 2020; Rasmitadila et al., 2020). In addition to providing the platform, which has been highlighted by previous studies as the critical input for the ERT, our study findings showed that a public repository with available online lesson plans and learning contents was helpful. When online learning content was unavailable from the school districts or the government, some teachers actively formed peer groups to collaboratively build, share, and distribute them.

Given that ERT required teachers to intentionally develop strategies to maintain classroom interaction and student engagement in online settings, teachers had to spend additional time to test out online technology, brainstorm ways to engage students online and help them with unexpected technical issues in addition to transitioning their in-person lesson plans to virtual activities. Thus, when online content became available from the school districts, teachers expressed that their burdens were finally lifted to focus solely on online classroom management, which was already a challenging task. Our findings bring several practical implications. First, we suggest gathering the online learning content that teachers across the nation have used systematically. Managing, governing, and curating them in ways that teachers can easily access them could support post-COVID ERT. These online learning contents should be updated to maintain sustainability. To encourage teachers to continue to create and share high-quality online learning content, a process of recognition or acknowledgement should be embedded as well.

In terms of *process*, the findings showed that student-teacher interactions/engagement impacted student learning during ERT. Hence, it is important to build instructor-student and student-student rapport. This could be done by preparing different activities for students during class. For instance, Richardson et al. (2009) introduce efforts such as creating a "meet your classmates" section of an online platform or coming up with icebreaker activities. Also, providing collaborative activities and experiential learning opportunities to prevent students from being passive learners can be helpful. Technology integrations can be effective as well. For instance, implementing strategies to facilitate students' communication and engagement by choosing technology for real-time communication such as chat, text messages, or collaborative whiteboard (e.g., Lowenthal & Dunlap, 2018; Richardson et al., 2009; Seckman, 2018) can be effective. For instance, using 360 cameras for better interactions or building a hotline for technological glitches can also be helpful. Lastly, providing pre-sessions for students to adjust to online learning (e.g., netiquette, rules, orientation) constantly monitoring student engagement and providing relevant, timely feedback are also critical.

Lastly, findings regarding *product* showed that it is important to consider learner outcomes, instructional strategies, and systemic transformation. Hence, it is crucial to assess students' achievement and provide relevant supplementary learning opportunities and resources to address gaps between students. Also, recognizing (counting/considering)

the value of additional learning outcomes beyond learning objectives, such as information literacy or digital literacy can benefit students. For instance, conducting formative and summative evaluations to confirm the effect of multiple modes of instruction and educational resources, soliciting feedback regarding strategies and resources for ERT, and implementing the necessary changes should be considered. Moreover, the empirical findings demonstrate that ERT is not an isolated event that only impacts students and instructors during the crisis. It provides a new perspective to instructors on how they view the future of education and impacts students' learning practices. Therefore, it is important to assess and identify what needs to be modified and what needs to be retained even after ERT mode is over.

We acknowledge that this study has a number of limitations. Given that this case study only collected and analyzed the data from a small number of South Korean teachers, it is limited in generalizing the study findings across countries. Also, our six teacher participants were purposefully selected from a particular region, so our findings cannot represent other regions of South Korea. Therefore, beyond the context of South Korea and its specific region, future studies will review ERT implementations and their design across regions and countries to yield a comprehensive design and implementation guide of ERT in crisis circumstances. Moreover, we also acknowledge that this study did not include data sources other than the individual interviews of six teachers. Also, because of the focus on teachers' experiences rather than their schools, the interviews did not fully capture the information on the differences in terms of the infrastructure and preparedness of the schools where the teachers worked. Further studies are necessary to implement quantitative and scalable data collection using multiple data sources and analyses to generalize the aforementioned factors on ERT implementations. Adding additional interviews with each teacher as well as data from other stakeholders such as students, parents, and administrators would further strengthen future studies. Also, as this study did not fully investigate the impact of ERT on students' long-term learning outcome and their relationships with technology, future studies on longitudinal outcomes of ERT in elementary teaching and learning are expected.

6. Conclusion

Using the analytical lens of the CIPP framework, we identified the key factors that impact ERT during a time of crisis. In order to do this, we investigated Korean in-service teachers' transitional experiences from in-person to online and hybrid classes in response to the pandemic and explored in-service teachers' various episodes and narratives in terms of transforming class settings. Several themes emerged that fall under each category of the CIPP framework. In terms of *context*, limited technological aptitude and lack of training in online instructional design as well as policy issues and socio-economic differences were identified as key factors in assessing the current state of the ERT. In terms of *input*, instructors' efforts as well as support from in and out of school were discussed. Student interaction and engagement were identified as key factors in understanding the *process* of ERT. Lastly, learning outcomes, instructional strategies, and systemic transformation emerged as *products* of ERT.

Author Statement

The authors declare that there is no conflict of interest.

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Appendix I: Interview protocol

Background information

- Please introduce yourself in terms of prior academic or professional experience, your current position, and how long you've worked as a teacher.
- Please describe the students you are teaching currently in terms of which grade they are in and how many students are in your classroom.
- Please tell me if you have prior experience utilizing online platforms before COVID-19. If so, please describe your experience of utilizing the online platforms for instruction.

Context evaluation

Recognition of the intrinsic need

- Please share any challenges or limitations you have experienced as you started online instruction during COVID-19.
- Please describe any expectations you had as a teacher when you started the online instruction.

Contextual factors

- Can you describe any requests or complaints from students as you offered online instruction, if any?
- Can you describe any requests or complaints from parents as you offered online instruction, if any?
- Can you describe any standards or requirements from the Office of Education that you had to consider or adopt as you transitioned to online instruction?

Input evaluation

Input from the teacher

- Can you share your teaching strategies or learning activities that you have implemented to address the challenges or limitations you have experienced while transitioning to online instruction?
- Can you share your teaching strategies or learning activities that you have implemented to address outside requests or complaints (i.e., from students, parents, and the Office of Education)?

Resources and support from the school

- Can you describe how you searched for and received resources and support from other teachers or the school, if any?
    - What resources and support were available from the school to transition to instruction?
    - What resources and support were available from the Office of Education to transition to online instruction?
    - Did you ask for parental support and collaboration while you offered online instruction?

Process evaluation

Students' perception of online learning

- How did students respond to teaching strategies and learning activities that you have implemented in your online instruction?

Teachers' perception of online instruction

- Can you share any memorable anecdotes or events during the implementation and use of the teaching strategies and learning activities?
- Do you have any other memorable experiences that you would like to share during your planning and delivery of online instruction during COVID-19?

Product evaluation

Students' achievement and satisfaction

- What do you think about students' overall achievement and satisfaction in an online instructional setting in comparison to face-to-face instructional settings?
- How do you think online instruction influenced your students?
  - Are there any aspects that students have changed due to their experience in an online instructional setting?
- Could you share your thoughts on the future of online learning in the context of elementary education?

Development of the teachers

- Are you satisfied with your experience of online instruction over one semester?
- Are there aspects that you feel that you have learned and grew as a teacher during your experience of online instruction over one semester? Please share.
- Are there any changes in your perception towards online learning as a result of delivering online instruction?
- If online instruction continues in the future, are there new ways that you want to try and implement in your teaching? What do you think are needed to implement these new ways?