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Teachers' Perspectives in Higher Education on Using Educational Technology During the COVID-19 Pandemic: Observations for Ghana, India, and Serbia

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Abstract

Objective: The purpose of this research was to understand the significant changes and challenges regarding teaching experiences during the coronavirus (COVID-19) crisis in three universities, one each in Africa, Asia, and Europe. The study provides information on how teachers adapted to online teaching under COVID-19 conditions.

Methods: We employed a descriptive phenomenology approach and used an online survey with open-ended questions to collect the data. Braun and Clarke's six steps of thematic analysis based on the traditions of descriptive phenomenology were employed to analyze the data.

Results: The teachers' adaptive mechanisms to the COVID-19 crisis could be described through the following steps: identifying the teaching challenges, developing awareness of personal learning challenges, initiating the process of learning by doing, and recognizing the lessons learned.

Conclusions: A global teacher's network could be established to encourage professionals from different fields of education to build conventional wisdom in the awareness of the need to constantly try out new strategies with cutting-edge technologies.

Implication for Practice: The results provide evidence of ways that future reactions by higher education to global crises can be anticipated. Further, the research provides an understanding of teachers' adaptation strategies during the COVID-19 crisis. Complementary studies show that institutions should be prepared in terms of both material and human resources for emergency remote teaching (ERT), and students should also be prepared mentally and materially for such unprecedented online teaching delivery and learning. Findings of the present study point to the benefit of faculty using communities of practice as an environment for learning and adapting to emergency situations.

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Introduction

Learning from home or outside educational institutions is not a new idea. The development of technology, especially the internet, has opened new possibilities for knowledge delivery, which come "in variations, such as blended or hybrid courses that are a mixture of face-to-face and web-based instruction, to fully 100% online instruction" (Merriam & Bierema, 2014, p. 171). With further technology and software development, especially around social media, knowledge, teachers, and universities have become even closer and easily accessible to learners. Moreover, university knowledge has become more open and reachable; for example, massive open online course (MOOC) platforms make it possible for students to access knowledge from universities worldwide.

This demand is not easy to meet, especially considering the unequal level of digital literacy among teachers and technical equipment within institutions as well as issues related to unequal access to the internet (i.e., the digital divide). "Online learning is often understood as synonymous with content-driven self-study, where the advantages are limited to (a relative) independence of time and space" (Teräs et al., 2020, p. 865). Moreover, creating and sharing content on some online platforms cannot be enough in a situation when each aspect of traditional teaching must be digitalized immediately.

The COVID-19 crisis unexpectedly pushed university staff and students worldwide into ERT. Systematic reviews indicate that the educational technologies used for ERT during the COVID-19 crisis were most often synchronous collaborative tools used in combination with text-based tools (e.g., Bond et al., 2021). One of the biggest challenges for both learners and educators identified in research from the United States was that they were "constantly challenged to keep pace with the deluge of new information, software tools, and devices" (Merriam & Bierema, 2014, p. 181) Furthermore, a comparative study conducted in Portugal and Brazil highlighted that a "crisis such as this one provides an opportunity for change by teaching to all community members, new skills and values" (Oliveira et al., 2021, p. 1373). These findings inspired us to design a comparative study that created the space for teachers' voices in the context of ERT during the COVID-19 crisis.

The subsequent paragraphs trace educational technology and the transition to emergency remote teaching during the pandemic within the context of three universities, one each in Ghana, India, and Serbia.

Ghana

Distance education in Ghana emerged as part-time study organized outside mainstream education settings and held during a convenient time for full-time workers; it met the needs of those individuals who found that the regular education system did not suit them. At its onset, distance learning was classified into two categories: credited and non-credited, with the former being delivered face-to-face or by correspondence, while the latter was mainly delivered through the mass media (Ansu-Kyermeh, 1991). Following the implementation of the Information and Communication Technology for Accelerated Development Policy in 2004, e-learning was integrated into regular and distance tertiary educational programs in Ghana. With the advancement of technology-enhanced learning, online learning became a supplement to traditional higher education as the most practical means of improving access to higher education (Asunka, 2008). This enabled

a change from institution-based learning to self-paced learning through online learning platforms, resulting in a shift from face-to-face to self-paced distance learning (Addah et al., 2012).

Nonetheless, online learning challenges emerged, such as inadequate information and communications technology (ICT) facilities, internet accessibility, and the lack of capacity among educators to manage ICT programs. These challenges influenced (both positively and negatively) the effective delivery of e-learning and distance education. Therefore, distance learning was mainly delivered in a format that included face-to-face teaching complemented by online learning primarily through learning management systems.

In early 2020, the COVID-19 pandemic rapidly transformed global education into fully online education characterized by ERT to reduce the spread of the virus. Just like other higher education institutions (HEIs) globally, many institutions in Ghana also resorted to ERT. In ERT, digital tools are used to facilitate teaching and learning. Video conference technology became the most used digital tool by HEIs in Ghana with a particular focus on Zoom (Amponsah, 2022). Although Huang et al. (2020) argued that these new technologies increase flexible learning in terms of both place and mode (e-learning, mobile learning, etc.), it should also be emphasized that the situation also increased the pedagogical and learning gaps already existing in HEIs in developing countries. The teachers and learners in most Ghanaian universities experience these technologies differently because of variations in accessibility stemming from internet connectivity challenges (Essel et al., 2021; Ogbonnaya et al., 2020) and digital literacy disparities among both teachers and students (Adarkwah, 2021). An understanding of teachers' perspectives on the use of educational technology is, therefore, a critical step toward creative problem-solving skills for ERT (Hodges et al., 2020), as well as enhancing the flexibility of teaching pace and mode (Essel et al., 2021).

India

The University of Delhi initiated correspondence education in 1962 with 900 students in its undergraduate program. Once the comprehensive Kothari Education Commission advocated for correspondence education and evening colleges to develop part-time and self-study programs, more institutions followed (Panda & Garg, 2019). The Andhra Pradesh Open University, later renamed Dr. B. R. Ambedkar Open University, was established in 1982 to meet the increasing demand and international developments in lifelong learning. The Indira Gandhi National Open University was also established in 1985 (Gaba & Li, 2015). Radio and television were used for education by 1975. In 1984, the University Grant Commission started a countrywide classroom television and video series. The content was produced at the university and broadcast through the government's national television network DOORDARSHAN.

Distance education was given a major boost when a dedicated satellite (EduSat) was launched. However, experimentation and the use of ICT in India were introduced more rapidly in primary education than in higher education. With increased internet access, digital initiatives in higher education emerged. In 1996 the Information and Library Network Centre (INFLIBNET) was established to network all libraries in higher education. In 2006 the National Electronic Knowledge Repository (e-gyankosh) of IGNOU was established and later placed in the public domain. The government-sponsored Study Webs of Active Learning for Young Aspiring Minds (SWAYAM) is an online MOOC providing content and courses free of cost to learners. Learners must pay a nominal fee for certification upon completion of their course and are required to take an examination attended in person at a designated center. SWAYAM PRABHA has more than 34 DTH channels with educational programs that are telecast 24/7 (Kadam, 2021).

By 2020, all conventional and open universities had shifted to online mode in response to the pandemic (Lahiri et al., 2021). In compliance with different governmental guidelines, the University of Delhi implemented various measures to ensure a smooth teaching-learning process. Teachers were asked to provide primary reading materials to students through their respective websites and other modes. Additionally, the university provided various learning resources. Virtual private network (VPN) connections were provided for

students and teachers to access library resources from remote sources. In the last week of March 2020, it was further clarified that face-to-face classes had been halted. The university advised students to engage in self-study and work on the reading materials provided. However, when the situation was prolonged, online classes started taking place using various digital tools. This situation has also paved the way for online universities. Although online degrees are not recognized in India, these new changes and their positive outcomes have given the authorities food for thought.

Serbia

Distance education in higher education in Serbia can be traced to the tradition of Yugoslavia's correspondence universities. Over the years distance education has been organized in different formats, including radio broadcasts, TV programming, and correspondence via mail. The educational programs were both formal and informal. Populations from isolated areas, workers, and prisoners were the focus; in general, they were adult learners. The collapse of the Yugoslavian adult education system brought the development of distance education to a halt. Furthermore, with the Bologna reform process, most faculties canceled the possibility of part-time studying, and employed students were tolerated rather than supported (Popović & Maksimović, 2013).

Prior to COVID-19, there were several accredited distance education programs, mainly at private universities. Before 2020, the education development strategy in Serbia was aimed at supporting the creation and implementation of distance learning higher education programs (Government of the Republic of Serbia, 2012). These activities were planned with the goal of increasing the percentage of the population with a higher education degree and offering a more flexible educational model especially suitable for adult learners. Some organizational barriers to distance education at universities in Serbia have been removed during the COVID-19 crisis, including changes in higher education law regarding the organization of examinations using e-communication (Government of the Republic of Serbia, 2021). However, online degree programs remain an unusual educational format at Serbian universities. Recent research findings on the effects of learning in online environments (LOE) in Serbia are "inconsistent and contradictory, so the application of LOE was carried out carefully and reasonably in education in developed countries, mostly in higher education" (Pešikan & Ivić, 2021, p. 21).

Most higher education institutions developed and used open-source learning management systems (LMS) as additional space for teaching, collecting, and presenting data relevant to the educational programs and sharing information relevant to students. During the COVID-19 crisis, classes were mainly delivered in an online format, and teachers had the freedom to select which platform they wanted to use. Belgrade University provided certain recommendations for the digital tools that should be used for online teaching. However, each faculty and teacher decided how they delivered the classes and the institution offered technical support. Because most teachers had to work from home, they used their own resources. The research dedicated to ERT in higher education has highlighted the challenges of internet access and the lack of adequate technical resources, skills, and experience in the field of digital teaching technologies (Munitlak Ivanović & Stamenković, 2021). In the case of Serbia, the "challenges related to the pandemic situation should not be viewed only from the aspect of threats, but also opportunities aimed at redefining teaching effectiveness, as well as presenting new sustainable academic practices" (Kuleto et al., 2021, p. 16).

Review of the Literature

Transition of Teaching and Learning in HEIs

Teaching and learning in HEIs prior to COVID-19 were mostly dominated by traditional face-to-face classroom interaction. That notwithstanding, online teaching and learning through diverse learning management systems (LMS) were also utilized before the global pandemic, even though this constituted a

smaller percentage of the entire teaching and learning processes for most developing countries. Online learning was usually used as a version of distance learning, which improves the educational possibilities of students who are unable to attend traditional face-to-face classroom sessions (Kuadey et al., 2022; Watson, 2008). The challenges of using educational technologies coupled with other institutional factors, including technological infrastructure shortages, the lack of expert technical staff, and inadequate administrative support, contributed immensely to the slow pace of fully integrating educational technologies into HEIs, particularly among developing countries (Habibu et al., 2012; Laudari et al., 2021; Treve, 2021).

COVID-19, however, introduced a new dimension to teaching and learning across educational systems that had not been envisaged (Goh & Sandars, 2020). Emergency remote teaching technologies replaced the traditional systems. Many educational institutions adopted online teaching and learning strategies to reduce the amount of instructional time lost because of the lockdowns implemented in many nations to stop the spread of the pandemic (Burgess & Sievertsen, 2020). Most of these institutions were unprepared in terms of both material and human resources, and students were also unprepared mentally and materially for the unprecedented online teaching delivery and learning (Laudari et al., 2021; Treve, 2021).

ERT did not only require teachers and learners to have the knowledge and skills to use computer systems, but online teaching and learning platforms as well (Ogbonnaya et al., 2020). Teachers and learners in many learning institutions in most developing countries have never been formally trained to teach online; most students have never been trained or had prior experience of learning entirely online either (Treve, 2021; Turnbull et al., 2021). The COVID-19 pandemic, therefore, ushered in the complete transition to online teaching and learning and increased the challenges posed by educational technologies in HEIs for teachers, learners, and institutions alike (Treve, 2021).

Teachers' Experiences of Digital Technology and Tools in HEIs

Most institutions and teachers needed to find the best infrastructure for online teaching because they did not have any independent technology infrastructure to support it. Cloud-based streaming providers are commonly characterized as platforms that try to make usage easier for new customers, but also function to segment the web behind pay-for-service barriers and/or by offering "free" services that are paid for through pervasive data collection (Grandinetti, 2021, p. 348). Therefore, teachers and higher education institutions had to deal with issues of privacy, security, surveillance, and the digital divide. Before the pandemic, ITC infrastructure, software selection, and cyber security were within the domain of university IT departments or technical faculties. However, moving teaching and learning entirely online without adequate preparation required almost all staff to be equipped with a basic understanding of digital platforms and their functionalities in the educational context. A lack of knowledge about the aforementioned issues also caused problems connected to online (un)ethical teaching (e.g., violations of the General Data Protection Regulation of intellectual and authorship rights; Boghian et al., 2021).

Another concern regarding online teaching technologies is related to understanding the pedagogical aspects of the platforms and software. The pre-pandemic research carried out by Castañeda and Selwyn (2018) even indicated that "technologies are framed in terms of their association with learning—i.e., "learning management systems" and "learning analytics," but at the same time we still know little about "the relationships between technology use and learning" (p. 2). The present research was designed on the premise that at the beginning of the COVID-19 crisis, teachers in higher education did not have enough time to think about learning the pedagogical aspects of technology, and that they had to "find many creative ways to overcome the obstacles of teaching in an online environment" (Ayisi-Addo et al., 2021, p. 38). Furthermore, in our previous research we found that "teachers' learning process is devoted to getting skills related to technology, but more valuable are insights about interaction and communication in the online world" (Ayisi-Addo et al., 2021, p. 40). The results show that we should focus primarily on the pedagogical skills related to

technology, not just on how to use technology. The qualitative study by Bruggeman et al. (2022) explored "university teachers' experiences with online education and revealed tension fields that influence their experiences, ranging from connection with students and colleagues to tension from support issues" (p. 9). Teachers intuitively used their previous online teaching experience to adapt to the new working conditions, including negotiating unequal access to digital resources, the Internet, software, and hardware (Laudari et al., 2021). Teachers need to be actively involved in making sense of digital spaces (learning tools and platforms) for online education. Also, institutions should provide faculty with the necessary technical and pedagogical support, since many of the elements of the teaching–learning process and their appropriate operational implementation, are unfamiliar to them (Benito et al., 2021).

Studies about the new teaching approaches developed during the COVID-19 crisis include, for example, models that combine asynchronous and synchronous modules in which learning includes multiple types of interactivities, such as real-time video delivery with live commentaries, the (re)use of recorded synchronous sessions for other classes, and real-time activity monitoring (Ho et al., 2021). This, in turn, has placed much more pressure on teachers delivering routine instruction, and there is a need to explore teachers' experiences with digital technology and tools.

Theoretical Framework

In this paper, we used technological determinism as a theoretical framework. Although it is evident that technology shapes teaching practice, we cannot be sure to what extent. Dafoe (2015) "propose[s] defining technological determinism more moderately as approaches that emphasize (1) the autonomy of technological change and (2) the technological shaping of society" (p. 1052). Furthermore, Dafoe (2015) analytically presents several claims, used as a part of the analysis strategy of this paper, related to technological determinism.

> The family of claims include the views that: (1) functional entities (artifacts, techniques, institutions, and systems) exert an effect on the world independent of human choice (technical determinism); (2) there is a broad sequence and tempo of scientific and technological advance (technological trends) that seem to follow an internal logic, making technological change seem autonomous; and (3) that people are insufficiently conscious of their technological choices (technological somnambulism) or have been co-opted (the magnificent bribe), such that the social order is becoming more machine-like over time. (Dafoe, 2015, p. 1052)

Cognizant of the fact that at some point during COVID-19 teachers had no other choice but to use technology for teaching, we focused on the social and cultural aspects of technological determinism in higher education and its effect on teaching transformation. This research is also based on activity theory inspired by Vygotsky (as cited in Oliver, 2011) where "the core is the proposition that actions are mediated—the unit of analysis is of a subject (a person) working towards an object (an objective) using a tool" (Oliver, 2011, p. 377). Finally, we are aware of the technological determinism critique in higher education. Felix (2021, p. 31) focused on the fact that the

> multifaceted use of technology in higher education or perhaps any other context for that matter is one in which the elements of human agency and technological affordance need to be taken into account, in addition to a range of contextual factors notwithstanding other considerations which lie beyond the control of any kind of technology itself and those that use it.

Statement of the Problem and Purpose of the Study

Teaching and learning using face-to-face classroom interaction were rapidly transferred to the online delivery mode to continue learning and to help to reduce the spread of COVID-19. The sudden radical changes in teaching modes through emergency remote teaching (ERT) technology impacted entire higher education systems, particularly among developing countries. Bearing in mind that teachers faced many novelties in the unexpected teaching transition to the virtual learning space, the purpose of the study was to understand the significant changes and challenges regarding teaching experiences during the COVID-19 crisis at universities. This paper examines the ways teachers adapted to the transition period under COVID-19 conditions. The research question guiding the study included understanding the mechanisms adopted by the teachers during the COVID-19 crisis.

Method

We used a descriptive phenomenology approach. Phenomenology facilitates the understanding of lived experiences, which are "closely linked to the idea of the intentionality of consciousness, or how meaning is experienced" (Sundler et al., 2019, p. 734). The experience of living, teaching, and learning under COVID-19 is still in the process of forming new meanings.

Participants

A sample of 21 respondents with various types of teaching experience (eight early-career teachers, seven mid-career teachers, and six senior teachers) were included in the study. This sample was deemed appropriate for small qualitative research projects (Braun & Clarke, 2019). Five public universities participated in the study (3 from Ghana, 1 from India, 1 from Serbia). We applied snowball sampling in this research. In the first step, colleagues actively engaged in teaching during the COVID-19 crisis were invited to participate in the research. Selected teachers were also asked to invite their colleagues to take part in the research. The ethical principles employed in this research include voluntary participation, informed consent, anonymity, confidentiality, and the possibility to withdraw from the research at any time. The research was approved by the Institutional Committee for Research Ethics of the University of Belgrade—Faculty of Philosophy under the official number SS04/1-2 No. 781/1.

Instrumentation

The data were collected by means of a survey consisting of eight open-ended questions. We asked the respondents to describe their professional roles and the working conditions under COVID-19 preventive measures to explain the most significant changes in teaching approaches. The survey also included questions about student evaluations and assessments during the COVID-19 pandemic, descriptions of which digital tools had been used for teaching before and during the COVID-19 pandemic, comments on the digital knowledge gained during the COVID-19 pandemic, and explanations of how they had adapted to working under the COVID-19 pandemic conditions. The data were collected from mid-August to mid-September 2021.

Data Collection

The data were collected using Google Forms. The research required no sensitive data. The link for the survey was circulated to higher education teachers by email and, in some cases, by instant messaging. The respondents answered the questions anonymously.

Data Analysis

Thematic analysis based on the traditions of descriptive phenomenology was employed. Braun and Clarke's (2006) six steps of thematic analysis were adopted for analyzing the data. The analysis began with familiarizing ourselves with the data that had been collected. We read the responses several times to understand the patterns and make initial analytical observations from the data. Next, we moved the analysis beyond the point of most literal meanings. The data were then coded to identify any patterns by grouping those with similar segments. We identified and labeled the relevant data features using Taguette (https://www.taguette.org/) qualitative data analysis software. Themes were then determined by clustering the codes into plausible subthemes. The themes were then reviewed to ensure they were appropriate for describing the coded data. Some themes were modified, while others were changed during the review process to create a distinct essence for the coded data. We defined and named the selected themes by writing a summary of each to provide conceptual clarity and a direction for discussion and report writing. Finally, we integrated the analytical narratives and the effective data extracts to provide direction for discussions and report writing.

Credibility and authenticity were assured by involving the voices of teachers from different countries and by providing the teaching context description before and after COVID-19 (Whittemore et al., 2001). Persistent observation is used to ensure the credibility of data together with member checks to ensure that researchers from each country understand the whole data set. Furthermore, we met the criteria of criticality and integrity by carrying out repetitive interpretation checks and reaching consensus in discussions between researchers (Whittemore et al., 2001).

Results

Which Mechanisms Were Adopted by Teachers During the COVID-19 Crisis?

We identified three main themes with seven sub-themes as the adaptive mechanisms used by the teachers during the COVID-19 crisis. These are presented in Table 1.

Table 1. *Teachers' Adaptive Mechanisms to the COVID-19 Crisis*

Theme	Subtheme	Definition
Identifying the Teaching Challenges	Unadopted pedagogical principles	The teachers applied the same face- to -face pedagogical principles to the online teaching format.
	Lack of interaction with students	The teachers did not achieve adequate interaction with the students.
	Inadequate Working Conditions	The teachers did not have adequate working conditions (software, hardware, working space, and internet challenges).
Being aware of the learning challenges	Inadequate learning conditions	The teachers did not have enough time, support, and resources for learning (professional development).
	Emotional challenges	The teachers were faced with negative emotions such as fear.
Process of learning by doing (experiential learning)	Learning in a community of practice	The teachers exchanged ideas within their professional community, including their students.
	Lessons learned	The teachers identified the approaches that worked the best.

Theme 1: Identifying the Teaching Challenges
The teachers applied the same pedagogical principles and teaching materials used in their traditional classroom teaching to online teaching. In Serbia, for instance, Teacher 14 mentioned that "it was necessary to adapt the syllabus and didactical material to the online model" during the COVID-19 crisis. Teaching practical skills was also identified as one of the difficulties for teachers in Ghana as a teacher also explained that "online teaching was not so helpful for situations where midwifery and nursing students have to work on patients or use simulations to learn psychomotor skills." (Teacher 3)

Teachers from all three countries highlighted the lack of interaction with their students as one of the major challenges. We saw this in the examples used in their responses. Teacher 18 wrote that "there was a lack of face-to-face interaction with the students." Teacher 11 stated that "the biggest change for me was the situation where the students do not want to or cannot turn on their cameras." Also, recognition of inadequate working conditions was identified as an important sub-theme. The teachers recognized that the technical infrastructure, such as poor connectivity, hardware issues, and limited working space, created inadequate working conditions. Working from home was stressful because "it demanded a different organization of my family life" (Teacher 14). The teachers from Ghana mainly mentioned problems with the technological infrastructure. Teacher 5 cited "teaching online within contracted semesters with very poor power, Wi-Fi and electronic network services."

Theme 2: Being Aware of Learning Challenges.
Teachers in all three countries identified challenges including the lack of dedicated time, programs, and systematic support for teachers to gain the necessary skills. Evidence of this is found in several of the teachers' statements. Teacher 2 wrote, "In fact, it forced my university, at the speed of light, to transition from blended learning to online learning which has its own opportunities and challenges." Teacher 20 stated that "the University and the Ministry of Education formulated some recommendations, but there are no unique standards for online teaching."

Emotional factors also influenced the teachers' adaptive and learning capacities. Teachers from Serbia and Ghana described the adaptation to the COVID-19 crisis from an emotional standpoint. Teacher 2 stated that teaching became "very strenuous, stressful and energy sapping." Teacher 14 expressed anxiety due to the infrastructure: "I always had the fear that my internet connection would stall, that some digital problem would occur during my teaching, which I would not know how to solve."

The initial unexpected and immediate transition to online education was followed by the self-reflective process of identifying the teaching challenges involved. The next step was the teachers' attention to their working conditions during the delivery of the online classes.

Theme 3: Initiating the Process of Learning by Doing
Learning by doing includes trying out various possibilities for online teaching and learning through trial and error. This learning is self-directed and oriented towards the teachers' professional community including students. Teachers from all three countries described the process of learning to teach online by doing it. Teacher 17 stated, "The exchange of experiences between colleagues was helpful …. we were exchanging experiences of working on different online platforms and their efficiency." Teacher 12 mentioned that searching for the best solution for online teaching happened alongside learning about the new tools: "I had to think and learn about the ways to use those online tools which enable a meaningful learning experience for students in this situation." Teacher 16 wrote about the possibility of exploring new teaching approaches, "Covid-19 enabled us to explore and experiment with online teaching and it has been working out well." However, at the same time, this process produced confusion: "Students are sometimes confused by the approaches and tools" (Teacher 20).

The second phase of the process of learning by doing is recognizing the lessons learned. The teachers from Ghana and India often pointed out how flexibility in teaching and learning could achieve the best results in the process of adaptation to the new working and living conditions. Learning by doing and experiential learning were identified in all three countries as the main approaches to adapting to the crisis, usually with a minimum of organized institutional support. Teacher 16 wrote, "Online teaching provides flexibility in timing and helps maximize interaction," and Teacher 5 mentioned that they experienced "modified schedules, slower teaching, and being more interactive in class with infrequent official assignments" (Teacher 5).

Discussion

This comparison of three very distinctive countries and contexts indicates that teachers in developing countries internationally reacted similarly to the COVID-19 crisis. Teachers in many institutions in most developing countries have never been formally trained to teach online (Treve, 2021; Turnbull et al., 2021). That fact explains why the teachers in our research placed greater emphasis on the emotional challenges, experiential learning, and learning by doing. The teachers' responses led to a deeper understanding of the four-step process.

These steps include 1) identifying teaching challenges; 2) developing awareness of personal learning challenges; 3) initiating the process of learning by doing; and 4) recognizing the lessons learned. Other researchers have pointed to the challenges of using educational technologies coupled with other institutional issues, including poor technological infrastructure, the lack of expert technical staff, and inadequate administrative support, particularly in developing countries (Habibu et al., 2012; Laudari et al., 2021; Treve, 2021). In the current study, the Ghanaian teachers mentioned difficulties related to the scarcity of technological infrastructure. In contrast, their Indian and Serbian counterparts did not report such concerns. However, a review of the country profiles indicated that all three countries faced comparable challenges with online education even prior to the COVID-19 pandemic. As a result, the teachers appear to have relied heavily on personal and available resources to overcome such infrastructure-related obstacles.

The aim of this study was to examine the ways teachers adapted to the transition period under the COVID-19 conditions. There is no doubt that technological trends and the tempo of scientific and technological advances facilitated the immediate transition to emergency remote teaching. Furthermore, there is evidence that the teachers had prior experience with online teaching. In all three countries, online learning served as a supplement to traditional higher education, providing greater accessibility to higher education for students (Asunka, 2008; Panda & Garg, 2019; the Government of the Republic of Serbia, 2012). The scientific evidence published to date indicates that faculty members who had online teaching experience showed more confidence during the COVID-19 crisis (Benito et al. 2021; Hebert et al., 2022; Laudari et al., 2021). However, at the same time the research results also show that teachers from all three countries mentioned that the shift to online education without adequate institutional support brought about fear, stress, and feelings of anxiety. A possible explanation for this is that the main task for university teachers during COVID-19 was to find the appropriate uses of specific technologies during the transition to online learning. Thus, teachers should have a thorough understanding of the available digital technologies used for teaching and learning. The results reinforce that teachers and universities followed the technological trends (Dafoe, 2015). However, at the same time, teachers should be aware of "people becoming insufficiently conscious of their technological choices, which lead us to technological somnambulism" (Dafoe, 2015, p. 1052).

Furthermore, experiential learning and being in the process of learning themselves helped the teachers to make good decisions regarding teaching strategies and the usage of digital technologies. Consistent with our findings, Whalley et al. (2021) concluded that higher education in the future should be based on the "wisdom" gained through collaboration and discussion instead of knowledge accretion (Whalley et al., 2021). This

argument indicates that technological determinism could be a good framework for a critical review of the relationship between technology and education, but that awareness of all the factors shaping the interactions and identities within the higher education ecosystem should also be developed (Felix, 2021). That point of view is in accordance with the findings of this research where teachers in all three countries showed that learning through cooperation and everyday reflection on their practice is much more than just using the available technology. Teachers need to identify alternative ways of framing the relationship between learning and technology. As Oliver (2011) proposed, we need to understand technology in terms of its ability to mediate action where the experience and expertise of the participants in the learning process play the main role.

Our main finding is that the teachers' adaptive mechanisms to the crisis should be understood as cyclic in that they identified the challenges of online teaching as an ongoing process that is interconnected with the continuous activity of responding to the different kinds of issues that arose. Moreover, learning by doing is an important step in this process. It is not the final step, but an initial step in gaining a better understanding of the challenges involved in the enhancement of the lifelong learning process.

Study Limitations

The critical limitation of this study is the sample size (21 teachers). Moreover, since the data collection was done via an online survey, the volunteer respondents may have provided shorter answers than they might otherwise have done during in-person interviews. In-depth expert interviews might have provided more information on the themes. The countries in which the research was conducted may represent a certain cultural bias. However, the results are strengthened by the involvement of institutions in three different continents that experienced similar conditions during the COVID-19 pandemic.

Implications for Theory and Practice

The results indicate certain ways that future reactions by HEIs to global crises can be anticipated. Further, the research provides an understanding of teachers' adaptation strategies during the COVID-19 crisis. Complementary studies show that institutions should be prepared in terms of both material and human resources for ERT and that students should also be prepared mentally and materially for such unprecedented online teaching delivery and learning (Laudari et al., 2021; Treve, 2021). The first proposal would be to test the identified steps regarding the reaction and response to the crisis in the post-COVID-19 period. It seems clear that the steps are ongoing reflective processes that could not be determined as sequential. However, at the same time, reflection will result in learning only by doing and repeated reflective processes. It is important to bear in mind that learning outcomes could be improved if teachers had the chance to share their experiences in their community of practice, which would build a sense of belonging (Felix, 2021).

It also seems clear that institutions used technology and digital tools without pedagogical preparation. This finding suggests technological determinism as a good analytical tool to recognize the aspects where technology started to shape education. The results of this study imply that faculty lecturers should be aware of their decisions regarding the usage of digital tools in the teaching process. Kirkwood (2014) presents the idea of "joined up thinking," which is required to specify the aims and purposes of using technology to support teaching and learning.

To do this, universities must be open to less formal and hierarchical management, with more decision-making power given to teachers. In addition, teachers and universities should be aware that they belong to the many global communities of users and consumers of advanced technological tools. A global teachers' network should be established in the format of a community of practice to encourage professionals from different fields of education to build conventional wisdom by exchanging experiences about application of cutting-edge technologies in teaching. Studies about teachers' participation in communities of practice during COVID-19 in

the United States, Argentina, and Thailand show that teachers rapidly adapted to the digital educational environment with assistance from their peers (Enriquez & Gargiulo, 2022; McLaughlan, 2021; Ulla & Perales, 2021).

Finally, in future research, we should seek the answer to the question: What is the role of 21st-century skills and competencies such as metacognition, critical thinking, and lifelong collaboration for teaching in (off)online spaces?

Conclusion

Learning and teaching conditions prior to COVID-19 were different than during the pandemic. Although the transition from traditional to online education was taking place, the pace was slow. In many circumstances, such a rapid change was not warranted. Teachers who were critical of online teaching experienced more stress, but were eager to learn (Stevens et al., 2023). Nevertheless, after the impact of COVID-19, higher education had to move online. Different online education tools were available, but their use significantly increased during the COVID-19 pandemic. We should be aware of the globalized aspect of technology and the wisdom generated through the community of users, in our case university teachers. The interaction between those two identities (digital tools user and teacher) is crucial and should form part of the lifelong learning process of becoming an innovative teacher.

For traditional teachers, choosing the right approach to online teaching was difficult, as they faced both institutional and personal challenges. In the future, online education and blended learning methods will most likely receive more attention. When we discuss the future of education, we are speaking of issues beyond the current traditional classroom.

Our research shows that there are no more ready-made recommendations or recipes for effective and successful teaching. Reflection, communication, and interaction should be the foundation of the future of higher education.

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