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Digital learning transformation: A study of teachers' post-Covid-19 experiences

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ABSTRACT

The COVID-19 epidemic has caused learning to change in ways that have never been anticipated before. This article examines teachers' difficulties due to COVID-19's global return of students from various modes, settings, and locations to a regular educational system. Although there are more online options, face-to-face instruction might be more effective. The article attempts to envision education in a post-COVID-19 world, hoping that learning systems will be improved by the pandemic's lessons and continue to be global, innovative, digital, student-centered, individualized, and useful in the face-to-face learning environment. As a result, the pandemic's teachings impacted and changed how people learn and teach. The post-COVID-19 educational environment's teaching challenges are evaluated using a 2-point Likert scale (1 = Yes, 2 = No). In addition, the T-test, Chi-Square goodness for fit test reliability of the similar notion of the questions, and Cronbach's alpha value (>.7) are used to evaluate the responses of 107 teachers from central Punjab, Pakistan. Findings show that 89.7% of teachers agree that they put more effort into educating and developing learning aptitude in students after COVID-19. Due to the epidemic catching the majority of educational systems off guard, there has never really been an opportunity to enact improvements in the education sector. Most of the teachers agreed that their position in the post-COVID-19 is not just that of an instructor or the sole content leader but also one of an organizer, counselor, motivator, and manager of learning activities.

1. Introduction

The emergence of COVID-19 has led to substantial changes in different sectors, with education being one of the most affected ones (Imran & Almusharraf, 2023a; Qiao et al., 2021). It has underscored the importance of digital transformation through e-learning and blended learning options in educational setups. This digital transition in learning methods has emerged as a strategic and inevitable response, ensuring educational continuity while upholding the quality of learning outcomes (Maqbool et al., 2024; Imran et al., 2024). In this context, educational institutions have seized the opportunity presented by the pandemic to adapt and grow (Maurya & Yadav, 2024). The COVID-19 pandemic has undeniably had a profound impact on the education landscape, with teachers having to adopt various online learning methods and evolve their teaching and learning experiences. However, this upheaval also presents an opportunity for positive change in the post-COVID-19 educational landscape. The pandemic has compelled schools and

universities to embrace digital transition and remote learning, underscoring the crucial role of technology in education (Rashid et al., 2022). Several studies (Akram et al., 2021; Alawamleh, 2020; Rapanta et al., 2020) reported that the integration of technology in education and digital transformation is not just a choice but a necessity in the post-COVID-19 educational landscape.

The COVID-19 pandemic has resulted in a significant change in education, affecting over 1.5 billion students who are now learning remotely, with digital education platforms becoming their lifeline (UNESCO, 2020). In Pakistan, according to the health department statistics, 1179 cases were reported by March 26, 2020; however, educational institutions throughout the country were completely shut down (Shehzadi et al., 2021). Furthermore, The COVID-19 pandemic caused significant disruption to Pakistan's education system, affecting over 46 million learners when schools were closed in March 2020. Teachers faced challenges adapting to online education, as less than 30% of children had access to digital devices. The economic impact was severe,

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with the World Bank estimating that nearly a million students might not return to school due to economic hardships. Additionally, school closures led to lost learning, with students facing setbacks, especially in rural areas with limited infrastructure (UNICEF & UNESCO, 2021).

Consequently, e-learning has evolved from a supplementary tool for face-to-face instruction to an indispensable reality (Qiao et al., 2021). New active teaching methodologies have emerged in education due to digital resources. The pandemic has made it necessary to adopt online teaching methods. It is important to explore their effects on future teachers, identify appropriate resources, assess benefits, and design inclusive interdisciplinary learning landscapes (Bond et al., 2021; Martín-Gutiérrez et al., 2022).

Meanwhile, disrupting regular teaching modules during the COVID-19 pandemic has posed difficulties for educators and educational institutions worldwide (Bashir et al., 2021; Dicheva et al., 2023; Khahro et al., 2020). The educational sector has been shut down, and in-person instruction and evaluation have been moved to an online setting. The instructors used blended and fully online learning delivery during this critical time to meet the best needs of students (Alawamleh, 2020). However, the pedagogical study investigated instructors' perceptions of teaching in post-COVID-19 classrooms and the effects of the lockdown on students' academic performance, quality of life, and mental health (Rashid et al., 2022). In face-to-face classes, most teachers struggled to rebuild learning strategies and evaluations (Martín-Gutiérrez et al., 2022).

Teachers have faced many difficulties during the pandemic due to unpreparedness and a lack of e-learning infrastructure, as UNESCO (2020) and Martín-Gutiérrez et al. (2022) reported. In this context, the Pakistan Alliance for Girls Education (PAGE) published a policy brief *post-COVID-19 Education Recovery* (2020). This policy was meant to protect children and educational facilities. On the other hand, the students have to deal with learning deficits, reduced academic skills, overexposure, and dependence on technology. However, some teachers went above and beyond to make learning fun and easy for their students, as evidenced by the studies conducted by Singha (2022) and Sujaya et al. (2023). As schools start to reopen, teachers must adapt and incorporate new teaching methods to help students transition back to face-to-face learning. This study aims to investigate the impact of the pandemic on teaching and learning and how the process has shifted towards digitalization. It further addresses the policy gaps by contributing to Sustainable Development Goal 4 (Quality Education) of the SDG 2030 agenda, as well as aligning with Pakistan's National Education Policy and technology initiatives that emphasize digital transformation and equitable access to quality education in the post-COVID-19 era.

2. Literature review

As a result of institutions' sudden closure, UNESCO (2020) recommended the use of distance learning and remote educational platforms to mitigate the impact of the pandemic on educational programs. Like other countries, institutions in Pakistan started offering instruction through digital platforms such as online classes, recorded lectures, and WhatsApp groups (Akram et al., 2021; Iqbal et al., 2022; Tabassum et al., 2022). Due to the pandemic, it is more important than ever for institutions to maintain high student satisfaction ratings to compete as high-quality institutions and ensure that the traditional educational model is long-term sustainable. Future expectations of learning, teaching, and assessments among students will be influenced by the best practices the institutions have adapted during and after the pandemic scenarios and teachers' experiences with remote delivery.

In a study, Canonizado (2021) discussed that the post-COVID-19 educational environments can present both opportunities and challenges for instructors. When a situation becomes an issue within a situation, it can become particularly challenging. Teachers typically strive to simplify problems and find solutions, but over time, everyone encounters difficulties. These challenges are further aggravated by the

health issues educators face as part of the current regular education system (Canonizado, 2021), which can hinder their ability to prepare educational modules effectively. Additionally, the current structure of regular education presents challenges for teachers. During times of crisis like pandemics or conflicts, Emergency Remote Education (ERE) allows educational institutions to respond swiftly by shifting instruction and assessments online (Shin & Hickey, 2021).

In today's digital age, academic institutions must prioritize digital fairness to ensure that students and staff can thrive in hybrid and distance learning environments. According to several studies (Dhawan, 2020; Gull et al., 2020; Imran & Almusharraf, 2023b), this requires a universally applicable approach that considers student demographics and promotes equitable access to essential equipment, internet access, and furnishings. By supporting staff and students and providing the necessary resources, institutions can combat digital poverty and promote retention rates, which is particularly crucial in the highly competitive higher education market (Bashir, 2021).

2.1. COVID-19 and its impact on digital education

The COVID-19 pandemic has created numerous challenges for educators designing day-to-day educational activities, especially in the post-pandemic world. Even though teachers have created online contingency plans for teaching and assessment through digital interfaces, they are still concerned about their students' learning capabilities (Rapanta et al., 2020). However, despite the challenges, educators and educational systems worldwide have made significant and rapid attempts at innovation and adaptation due to the closure of educational facilities (UNICEF, 2020).

During this critical time, online resources such as Google Meet, Zoom, MS Team, and similar tools have supported students' learning needs and offered realistic simulations of scientific investigations (Rashid et al., 2022). However, the pandemic has also highlighted several issues teachers face, as Dhawan (2020) reported in his study. These issues include infrastructure problems, noncompliance with virtual learning, insufficient contact between students and educators, and time constraints brought on by social and digital inequality. Teachers have also expressed concerns about the lack of adequate home workspaces for their students (Darby, 2020). Despite the challenges, educators continue working towards innovative solutions to ensure students receive the best possible education in the current climate.

In their studies, Iqbal et al. (2022) and Whalen (2020) investigated that the COVID-19 pandemic has significantly impacted the education sector, forcing teachers and students to adapt to online learning platforms. However, this sudden shift has not been without its challenges. Issues such as slow internet connectivity and lack of access to e-learning tools have posed significant challenges for students and teachers. Moreover, while some researchers argued that higher-level graduates are better suited for distance learning, it is important to note that younger students often face additional barriers, such as a lack of connectivity or inadequate educational resources at home (Imran et al., 2024, Imran & Almusharraf, 2024; Whalen, 2020). Despite these challenges, many educators have risen to the occasion, though not without encountering their difficulties. For instance, instructors lacking the necessary skills for online teaching may struggle to adapt quickly in emergencies, resulting in suboptimal learning outcomes (Marinoni et al., 2020). Additionally, health concerns and increased domestic stress for teachers have made it challenging to prepare courses promptly, especially when doing so for the first time (Alawamleh, 2020).

Zhao (2020) and Zamorro et al. (2021) believed that the adaptations and advancements made in response to COVID-19 might not be the most effective solutions for the education industry in a post-pandemic world. Therefore, educators must take a thoughtful approach to their decision-making process and avoid making hasty choices. By doing so, they can create lasting and positive changes that will significantly impact both teachers and students in the long run.

2.2. Envisaging post-COVID-19 teaching challenges

As the pandemic continues to adversely affect almost all educational institutions worldwide, the COVID-19 and post-COVID-19 period bring about significant educational changes. This presents an opportunity for educators and students to reconsider and develop a more adaptive education system rather than the inflexible, outdated models institutions are likely to uphold (Sujaya et al., 2023). Therefore, there is a growing need to reshape schooling as the world recovers from the COVID-19 pandemic. Redesigning the curriculum for the post-COVID-19 era is a crucial focus for educational researchers and intellectuals who want to help students acquire new skills for the modern world. The COVID-19 generation is returning to school after spending considerable time in the digital world; thus, the curriculum needs to prepare them for success in the age of intelligent machines and equip them to embrace globalization to inculcate entrepreneurial and creative abilities (Darby, 2020). Instead of the conventional fixed "template" of information and material solely focusing on the learners' emotional and social well-being, the post-COVID-19 curriculum must increase the children's aptitudes for learning (Kallio & Halverson, 2020; Tucker, 2020).

2.3. Impact on students' attitude and health

The COVID-19 pandemic significantly impacted students' attitudes and health, making it challenging for teachers to manage their students' well-being in post-pandemic classrooms. Many students face various challenges upon returning to university, such as stress, lowered levels of focus, and a lack of enthusiasm for physical activity (Imran & Almusharrarf, 2023a; Almusharrarf & Khahro, 2020). According to Bashir (2021), social media use by students increased by 93% during lockdowns, with daily usage ranging from 0 min to 12 h. Teachers and students alike have had to deal with feelings of low mood, hopelessness, anxiety, and depression during and after the pandemic (Almusharrarf & Khahro, 2020).

Moreover, White and Van Der Boor (2020) emphasized that to address these challenges, institutions need to develop effective teacher training courses using online sources to interact with global speakers and educational professionals. Art students must also be given access to new developing approaches and tactics in their respective fields. This will enable teachers to blend traditional classroom settings with online learning and adopt mixed or hybrid learning approaches to instruction and learning. Teachers can significantly enhance their students' mental and physical well-being by integrating extra lesson plans focused on meditation, utilizing web support, and embracing web-enhanced education (Imran & Almusharrarf, 2024).

2.4. Post-Covid opportunities and challenges for improving teaching practices

Online teaching has significantly changed traditional schooling practices, which have always required students to be in a physical classroom for learning. However, while this new approach to education is not ideal, it does offer some benefits. According to Alawamlah (2020), remote learning beyond the pandemic could provide students with access to global experts and enable them to learn beyond the four walls of a classroom. Additionally, students have more flexibility with their learning schedule, allowing them to dedicate more time to their studies.

Nonetheless, online learning comes with challenges, particularly during video calls. Students may feel compelled to leave the room, struggle with poor lighting and background noise, and may have to deal with other household members' privacy concerns. Many students also feel self-conscious about their appearance on camera and are hesitant to turn on their video cameras during online lectures (O'Hara et al., 2006). There is also the fear of dysmorphic worry, where individuals worry that their body parts, such as their faces, may appear unflattering on camera (Bashir, 2021). To alleviate some of these concerns, experts suggest

adjusting the camera angle to a more favorable position and grooming oneself before a video call, such as applying makeup and styling hair (Pikoos et al., 2021). Finding ways to address these challenges is important to ensure that online learning remains effective.

2.5. Impact on teachers and students from deprived demographic areas

Teachers and students in developing countries face challenges regarding teaching resources, such as internet connectivity, electronic devices, personal space at home, and electricity breakdowns (Bashir, 2021). Additionally, due to noisy home environments, many teachers and students are hesitant to switch on their cameras or microphones during online classes (Shin & Hickey, 2021). Some feel intellectually disadvantaged due to a lack of access to technology (Reich et al., 2020).

Recorded lectures can be especially helpful for non-native English speakers, allowing students to pause, rewind, and take in information at their own pace (Hall & Villareal, 2015). However, students may still struggle with using microphones and cameras during online classes. When asked to turn them on, teachers often provide weak justifications for not doing so (Risko et al., 2012). According to O'Hare et al. (2017), technological advancements have the potential to help distance learning institutions market academic and technical courses to students overseas, particularly those who are employed. Additionally, presenting information in shorter bursts can maximize student engagement and retention, especially as human attention spans decrease.

2.6. Digital transition effect on education for working people

The shift towards digital education has profoundly impacted individuals who work while pursuing academic studies. Such working-class benefits greatly from online education because it offers flexibility and convenience that fit well with their busy schedules. Recent studies suggest that a vast majority of modern professionals prefer online and distance learning platforms; according to Greany (2022), approximately 94% express a willingness to stay with an employer that supports their professional development (Edwards-Fapohunda & Adediji, 2024; Greany, 2022; Mataboge, 2024). However, it is concerning that access to educational opportunities that relate to work remains limited, with only 15% of individuals currently able to take advantage of such opportunities (Cooke, 2022). This highlights a significant gap between the demand for professional development support and its availability in the current workforce landscape. As the workforce adapts to the rapidly changing nature of employment, understanding the implications of the digital transition in education for working individuals becomes increasingly crucial.

3. Methodology and study design

This study uses a mixed-method approach to investigate the challenges faced by teachers in improving student learning after the COVID-19 pandemic. Burn's Transformational Leadership (Bass, 1999) and Piaget's (1970) and Vygotsky's (1978) Constructivist Learning Theories have been consulted as a theoretical framework to focus on the challenges teachers face during and after COVID-19 and understanding the evolving teachers' roles in digital and face-to-face educational contexts. The study aims to identify the main issues teachers encounter in the post-pandemic educational environment in Pakistan. It considers teaching efforts, school policies, and teacher roles as independent variables (IDVs) and student learning outcomes as dependent variables (DVs). To assess these challenges, a 2-point Likert scale (Yes = 1, No = 2) is used to measure teacher responses regarding their experiences with online teaching and the shift in their roles during and after the pandemic. Data is collected through a structured survey from a random sample of 107 teachers from various educational institutions in Central Punjab, one of Pakistan's most densely populated regions, to capture teachers' diverse educational challenges in urban and rural areas.

Central Punjab hosts a high concentration of educational institutions, yet many rural schools lack access to essential infrastructure and advanced technologies, which are critical for effective online teaching and post-pandemic education. This geographical location was selected because it provides a comprehensive view of the disparities in educational resources and technological integration across different institutions. This population sample is randomly collected based on participants' availability as volunteers. Formal permission via phone calls was received before starting the data collection process. All ethical and privacy procedures have been followed strictly to keep the participant's information confidential and anonymized.

Statistical analyses, including the Chi-Square goodness-of-fit test (χ^2), T-test, and Cronbach's alpha (α) for reliability, are conducted using SPSS to evaluate the hypotheses. The reliability of the data was measured using Cronbach's alpha, which resulted in a value of .576. While this indicates some degree of internal consistency, it falls below the commonly accepted threshold of .7, representing a potential limitation in the robustness of the data's reliability. Despite this, the reliability is considered adequate for exploratory research. The findings are interpreted through contextual analysis, aiming to explore the changing role of educators and the effectiveness of post-pandemic teaching methodologies in Pakistan.

3.1. Hypothesis of research

H1. Satisfaction of teachers with online teaching methodologies without prior preparation

H2. The teacher performs as an organizer, counselor, motivator, or manager of learning activities rather than an instructor after COVID-19

H3. Teachers put more effort into educating and developing students' learning aptitude after COVID-19.

H4. Attending live online lectures is more beneficial for students than watching pre-recorded lectures.

H5. Teachers feel to change the curriculum after COVID-19

4. Findings and results

The findings of this study highlight the impact of COVID-19 on education, specifically online teaching, and the roles of educators. It examines teacher satisfaction with online teaching, the evolving role of educators, challenges in student learning, student preferences for live vs. pre-recorded lectures, and teachers' perspectives on post-COVID curriculum changes. The findings offer insights into the changing educational landscape and implications for educators, policymakers, and stakeholders in the digital age. Following are the results concluded after data analysis related to each hypothesis.

- 1. Satisfaction with Online Teaching Methodologies without Prior Preparation:** A significant 73.8% of respondents expressed dissatisfaction with online teaching methodologies when they had no prior preparation. The results of the Chi-square goodness-of-fit test ($\chi^2 = 24.308, p < 0.000$) and T-test ($T = 13.595, p < 0.000$) confirmed this sentiment. The reliability of the data was measured using Cronbach's alpha, which resulted in a value of .576, indicating an acceptable level of consistency, though slightly below the desired threshold of .7.
- 2. Teacher Roles during and post-COVID-19:** In the post-COVID-19 educational landscape, 71.9% of teachers agree that their roles have shifted towards being organizers, counselors, motivators, or managers of learning activities rather than traditional instructors. This change was validated by the Chi-square goodness-of-fit test ($\chi^2 = 20.645, p \leq 0.000$) and the T-test ($T = 3.891, p \leq 0.000$). The Cronbach's alpha value for this data was .457, which, being

- significantly lower than the commonly accepted threshold of .7, represents a limitation in the reliability of the data for this analysis.
- 3. Increased Effort in Educating Students Post-COVID-19:** A large majority, 89.7% of respondents, believe teachers need to put in more effort to educate and develop students' learning aptitudes after COVID-19. The Chi-square goodness-of-fit test ($\chi^2 = 67.523, p \leq 0.000$) and the overall significance ($p \leq 0.000$) supported this finding. The Cronbach's alpha value was calculated at .450, which is below the ideal threshold but still acceptable for this study. Because the Cronbach's alpha value of .457 is deemed acceptable due to the exploratory nature of the study and the diversity of survey items, which reflect varied teacher experiences in the post-COVID-19 educational environment. Lower reliability is often tolerated in exploratory research contexts.
 - 4. Preference for Live Online Lectures over Pre-recorded Sessions:** About 72.9% of respondents indicated a preference for attending live online sessions rather than watching pre-recorded lectures. This preference was statistically supported by the Chi-square goodness-of-fit test ($\chi^2 = 20.645, p < 0.000$) and T-test ($T = 4.784, p < 0.000$). The reliability of the responses was measured with a Cronbach's alpha value of .564, which, while not ideal, was accepted.
 - 5. Perceptions of Curriculum Change Post-COVID-19:** A majority of 71.9% of teachers agreed on the need for curriculum changes after the pandemic. The Chi-square goodness-of-fit test ($\chi^2 = 22.439, p \leq 0.000$) and T-test ($T = 3.738, p \leq 0.000$) validated this finding. The reliability measure, Cronbach's alpha, resulted in a value of .542, which is lower than the desired .7 but was still considered acceptable for this analysis. The following **Table 1** shows the frequency of responses during this study.

Table 1 shows that the response rates of 107 respondents are recorded based on five label assertions. According to **Table 1**, 73.8% of respondents (teachers) acknowledge their dissatisfaction with online teaching approaches without prior preparation. Following the COVID-19 survey, 71.9% of teachers now manage learning activities rather than instruct students. According to 72.9% of respondents, live online lectures are more beneficial than pre-recorded lectures. In contrast, 71.9% of teachers feel the curriculum should be changed after COVID-19. After COVID-19, 89.7% of teachers feel they must put more effort into educating and fostering students' aptitude for learning (as DV).

The Chi-square goodness for fit test findings in **Table 2** supports the research objectives by demonstrating the correct hypotheses regarding obstacles faced after COVID-19 schooling.

The data presented in **Table 2** revealed that 73.8% of respondents are satisfied with online teaching methodologies introduced with prior preparation. Additionally, 71.9% of teachers report that their roles shifted from being instructors to acting as organizers, counselors, and motivators after COVID-19. A significant 89.7% agree that they have

Table 1
Details of teachers' responses frequency.

Labels	Observed N/Ratio			
	Yes	%	NO	%
Are you satisfied with online teaching methodologies as a teacher without prior preparation	28	26.2	79	73.8
The teacher performs as an organizer, counselor, motivator, or manager of learning activities rather than an instructor after COVID-19	77	71.9	30	28.0
Do you have to put more effort into educating and developing students' learning aptitude after COVID-19?	96	89.7	11	10.3
Attending online lectures through live streaming is more beneficial for students than watching pre-recorded lectures.	78	72.9	29	27.1
Do you feel about changing the curriculum after COVID-19	77	71.9	30	28.0

Table 2
Chi-Square test.

Questions	Chi-Square Value	Degrees of Freedom (df)	Asymptotic Significance (p-value)
Are you satisfied with online teaching methodologies as a teacher without prior preparation?	24.308	1	.000
After COVID-19, the teacher performed more as an organizer, counselor, motivator, or manager of learning activities than as an instructor.	20.645	1	.000
Do you have to put more effort into educating and developing students' learning aptitude after COVID-19?	67.523	1	.000
Do you feel about changing the curriculum after COVID-19?	22.439	1	.000
Attending online lectures through live streaming is more beneficial for students than watching pre-recorded lectures.	20.645	1	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 53.5.

had to put extra effort into developing students' learning aptitude post-pandemic. Furthermore, 71.9% of teachers believe the curriculum needs to be revised to address the new challenges. Lastly, 72.9% of respondents find attending live online lectures more beneficial than watching pre-recorded ones.

Moreover, the following Table 3 discusses the results of the T-Test Data Analysis.

Table 3 provides details about the pair results. The result of pair 1 of DV (Teachers face challenges in initiating or developing learning aptitude after COVID-19 in students) and IDV (Satisfaction with online teaching methodologies as a teacher without prior preparations), the value of $T = 13.595$, Sig. (2-tailed) $p (.05) > .000$, null hypothesis rejected. The result of pair 2 of DV and IDV (Teacher performs as an organizer, counselor, motivator, or manager of learning activities rather than instructor after COVID-19), the value of $T = 3.891$, Sig. (2-tailed) $p (.05) > .000$, null hypothesis is used. The result of pair 3 of DV and IDV (teachers feel they need to change curriculum after COVID-19) is $T = 3.738$, Sig. (2-tailed) $p (.05) > .000$, null hypothesis is rejected (Pallant, 2020). The result of pair 4 of DV and IDV (classes attended live online lectures are more beneficial than relying only on pre-recorded lectures

Table 3
Paired sample tests.

IDV Pairing with DV (Labels/Variables)	Paired Differences				T	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Pair 1 Are you satisfied with online teaching methodologies as a teacher/student - Teachers put more effort into educating and developing students' learning aptitude after COVID-19	.63551	.48355	.04675	.54283	.72819	13.595	106	.000
Pair 2 The teacher performs as an organizer, counselor, motivator, or manager of learning activities rather than an instructor after COVID-19 - Teachers put more effort into educating and developing students' learning aptitude after COVID-19	.17757	.47211	.04564	.08708	.26806	3.891	106	.000
Pair 3 Teachers feel to change the curriculum after COVID-19 - Teachers put more effort into educating and developing students' learning aptitude after COVID-19	.16822	.46553	.04500	.07900	.25745	3.738	106	.000
Pair 4 Attending online lectures through live streaming is more beneficial for students than watching pre-recorded lectures- Teachers put more effort into educating and developing students' learning aptitude after COVID-19	.17757	.38395	.03712	.10398	.25116	4.784	106	.000

for students), the value of $T = 4.784$, Sig. (2-tailed) $p (.05)$, $.005 > .00$, a null hypothesis is rejected. The null hypothesis is used as a baseline to test whether the observed shift in teachers' roles post-COVID-19 is statistically significant, and it is rejected due to the significant T-test result.

For evaluating the consistency of related questions, Cronbach's alpha ($\leq .7$) was used as a reliability measure, widely accepted as an indicator of internal consistency. Therefore, in this study, an alpha value of .657, calculated across five standardized items, was deemed adequate within the Pakistani context. Therefore, the scales used in this research are considered reliable, as confirmed by the reliability statistics shown in Table 4.

Table 5 provides a detailed description of this study's findings to help readers better understand the statistics behind the findings.

4.1. Reliability analysis

The (α) for the satisfaction of respondents with online teaching methodologies without prior preparations ($.576 \leq .7$), so the result is accepted. The (α) for teacher performs as an organizer, counselor, motivator, or manager of learning activities rather than an instructor after COVID-19 ($.457 \leq .7$), so the result is accepted. The (α) for teachers have to put more effort into educating and developing learning aptitude in students after COVID-19 ($.450 \leq .7$), so the result is accepted. The (α) for teachers feels like changing the curriculum after COVID-19 ($.564 \leq .7$), so the result is accepted. The (α) for attending live online lectures is more helpful than watching pre-recorded lectures for students ($.542 \leq .7$), so the result is accepted.

4.2. Discussion

Before COVID-19, schools served as the primary learning environment and the exclusive time for learning (Imran et al., 2021). The default model involves all students attending lessons on digital screens simultaneously, similar to a traditional classroom setting, except that the students and the teacher are not in the same physical location. According to Zhao (2020), this is one of several ways that educational institutions can offer remote learning. As a result, this tactic is probably the most frequently used by academic institutions (Dorn et al., 2020).

As a result, flipped classrooms and blended learning as one of the

Table 4
Reliability statistics of variables.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.575	.600	5

Table 5
Item-total satisfaction.

Label Statements	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Are you satisfied with online teaching methodologies as teachers	4.9346	1.232	.234	.112	.576
The teacher performs as an organizer, counselor, motivator, or manager of learning activities rather than an instructor after COVID-19	5.3925	1.052	.433	.308	.457
Do you have to put more effort into educating and developing students' learning aptitude after COVID-19?	5.5701	1.210	.526	.393	.450
Do you feel to change the curriculum after COVID-19	5.4019	1.205	.257	.342	.564
Attending online lectures through live streaming is more beneficial for students than watching pre-recorded lectures.	5.3925	1.165	.295	.366	.542

most effective teaching methods have recently been promoted in the wake of the pandemic. Additionally, since learning has moved online due to COVID-19, convincing students and teachers to continue is not challenging (Imran & Almusharraf, 2023b). The online instruction methods are unsatisfactory to 73.8% of the teachers without prior preparations. Therefore, the students are free to take classes at set times physically and are not obliged to be present in physical areas in a hybrid learning environment. As a result, it grants students greater control over their learning and extends their learning time outside the classroom through their global learning environment (Kallick & Zmuda, 2017).

Some students would rather not be seen because they are self-conscious and uncomfortable being on camera. Some students sought opportunities to participate in lectures and wanted them to be more engaging. In contrast to offering pre-recorded lectures, 72.9% of respondents prefer having recorded lectures available after the live session so that students can review the material. However, they are also reluctant to appear live on camera (Robertson et al., 2021). The students prefer more interactive professors. Despite their reluctance to put on cameras, students who struggle to learn in person due to peer disruption see advantages in relocating the online learning environment.

Successful online learning models combine synchronous and asynchronous sessions to cater to different learning preferences. Therefore, rather than requiring students to memorize known solutions to known problems, instructional practices should emphasize student-initiated research. Instead, students should be assisted in developing skills to deal with the unknown and unpredictable. Additionally, lessons can be recorded and accessible at any time by each student, and assessments can be performed later within the allotted time so that students' learning time is not synchronized with one another or the teacher.

As institutions reopen following the epidemic, Tucker (2020) suggests that the mixed or hybrid delivery technique is more effective as a post-COVID-19 teaching strategy. The sensible advancements made during the pandemic must thus mesh with in-person instruction and learning. However, demography and digital equity must be considered when preparing for this form of learning (Wehmeyer & Zhao, 2020). The combination of online and in-person learning offers a promising teaching paradigm, drawing from the experiences of COVID-19. This well-designed blend of online and in-person instruction is poised to be more advantageous both now and in the future for learning circumstances following COVID-19 (Tucker, 2020).

As students now have varied skills, passions, and limitations, teachers can differentiate instruction in the classroom while allowing students to have a more significant say in creating their learning activities and surroundings (Tomlinson, 2014). It must be designed with personalized learning in mind. In essence, it suggests that teachers should work to make learning more engaging by enhancing learner involvement and empowerment and assisting students in understanding and mapping out their learning pathways (Kallick & Zmuda, 2017).

Educational institutions need to treat teachers as partners in learning and development so that they can develop into fully functional employees of the broader educational system. It is also widely acknowledged that for learners and educators to flourish in a future globalized

world, a new set of talents must precede the already valued skills and knowledge. Duckworth and Yeager (2015) noted a rise in new curricula emphasizing modern skills such as creativity, critical thinking, entrepreneurship, teamwork, communication, growth mindset, and global competence.

Similarly, 71.9% of teachers agree that their position in the post-COVID-19 is not just that of an instructor or the sole content commander but also one of an organizer, counselor, motivator, and manager of learning activities. Notably, the role of the teacher changes in post-COVID-19 time when students are given the opportunity and empowerment to own their learning and have full access to learning resources, necessitating changes in teacher education as well (Kallio & Halverson, 2020). Their talents are improved by being aware of the learners' instruction. Due to the prolonged health crisis, it is challenging for teachers to guarantee that their students' skills are improving.

A total of 89.7% of teachers agree that, following COVID-19, they have put more effort into educating and developing students' learning aptitude. The students complete and do the exercises that the teachers assign. Performance activities often integrate the subject matter that the learners have learned. Teachers can quickly assess whether their students regularly practice what is helpful in skill improvement by watching them demonstrate their abilities.

Furthermore, student-centered, inquiry-based, and authentic teaching strategies can assist students in building the skills they need to deal with various circumstances rather than simply memorizing answers. In contrast, it is still crucial for educators to concentrate on students' human development as members of local, national, and global society. Teachers must help pupils develop the most basic practical skills. Education requires lifelong learning, fulfillment, welfare, happiness, possibilities, and the capacity to contribute to humanity constructively.

Therefore, educational institutions must provide complete access and in-depth exposure to all subjects across all years to enable students to make educated selections and develop their passions and unique abilities. There are various reasons students should be more involved in their education (Mugo et al., 2010). The pupils may not be able to relate appropriately to the subject they are all required to master in the classroom because they come from different backgrounds and have a variety of abilities and interests.

Therefore, while teachers advocate classroom differentiation, students must be given the tools and encouragement to be more active in shaping their learning and learning settings (Tomlinson, 2014). Ultimately, student empowerment can allow them to choose their learning paths (Zhao, 2020). Therefore, educational institutions should be created with students in mind, their needs, and the flexibility to engage actively in some institutions' operations.

Students are co-owners of their learning because of their right to self-determination, which implies they can choose their study settings (Zhao, 2020). Students can then have personalized learning plans and actively engage with the school community. Students can learn from professionals via the Internet; therefore, they do not always need teachers to continuously and directly instruct them. Thus, when students are given the tools to manage their learning and have access to materials, the role

of the instructor must shift.

After the pandemic, teachers have to deal with kids who are depressed, anxious, and in a bad mood in physical education lessons. Research from UNICEF (2020) indicates that 39% of students have attention problems. Contrary to what was anticipated in post-COVID-19 education, individuals' poor moods could not be prevented by engaging in physical activity, illustrating mental health's complexity and multifaceted nature. Social interaction after social isolation may have worsened for people already living alone or insulating themselves. As a result of parents' terrible financial situation following the epidemic, the retention rate of students declined. After the global pandemic, there were 649,000 fewer teachers on the payroll (Campbell & Caul, 2020).

However, a fully asynchronous delivery may not meet the needs of all students, especially those who are more deprived, given the lack of widespread satisfaction with their home learning environment. It also implies that students who cannot study at home owing to an unsuitable environment or experiencing digital poverty will want a location on campus with computers and internet connection, whether in the library or other student-focused locations (Bashir, 2021). Students need digital tools, and there is no doubt about that in the present world. Change is often necessary for organizations to survive. Employees can expect to receive online training as the workplace becomes increasingly virtual.

In addition, 71.9% of educators support curriculum changes in the wake of the pandemic. The curriculum must offer a globally and environmentally integrated educational experience (Zhao, 2020). A new curriculum must support kids in developing competencies like creativity, emperorship, and competency to prosper in the era of smart technologies and a globalized world (Barber & Mourshed, 2010). Additionally, a flexible curriculum must enable educators and learners to identify their areas of strength and interest, allowing them to create unique teaching and learning routes without being too constrained by and subjected to the predetermined curriculum (Wagner & Dintersmith, 2016).

Similarly, to acquire fundamental competencies and learn the most common expectations and norms, teachers and students must feel at ease and have a minimal framework of necessary information and skills (Wagner & Dintersmith, 2016). Additionally, a fresh, personalized curriculum needs to help the pupils become better students (Zhao, 2020). A flexible curriculum that allows students to choose the subjects they are interested in through counseling sessions is ultimately required. It focuses on teachers enabling students to develop unique learning paths as they follow their passions and strengths (Zhao, 2020).

Additionally, allowing students to suggest learning objectives as part of the curriculum development process allows them to exercise self-determination. According to Wehmeyer and Zhao (2020), students will be able to identify the effects of their actions, support the development of skills and habits for lifelong learning, and take responsibility for their education. Future curricula should be able to contextualize and adapt reasonable adjustments as needed. In order to avoid subjecting all students to identical material, educational institutions must relax the rigid curriculum requirements depending on their discretion while negotiating some aspects with the students.

According to educators and institutions, students should be allowed to develop their learning pathways without being unnecessarily constrained by a predetermined or recorded curriculum (Wagner & Dintersmith, 2016). As a result, the national curriculum for all pupils should only include the bare minimum of skills and knowledge. Additionally, rather than insisting that all students learn the same material, educational institutions might allow students to negotiate a portion of their curriculum. It suggests that students should be free to choose what, how, and when to study and how they want to be evaluated.

5. Conclusion

This study concludes that while numerous educational institutions have transitioned to e-learning to mitigate the educational disruptions

caused by widespread lockdowns, the abrupt and unplanned shifts in teaching and learning methodologies have created enduring global impacts on education that will persist for years. However, the pandemic allowed educators to change in response to the needs of learners collectively. The analysis of this current investigation highlighted that the online instruction methods are unsatisfactory to 73.8% of the teachers without prior preparations. At the same time, 89.7% of teachers agree that they put more effort into educating and developing learning aptitude in students after COVID-19. Similarly, most of the teachers agreed that their position in the post-COVID-19 is not just that of an instructor or the sole content commander but also one of an organizer, counselor, motivator, and manager of learning activities. In addition, many educators support curriculum changes after the pandemic because the curriculum offers a globally and environmentally integrated educational experience. In other words, there needs to be a change in pedagogy, curriculum, evaluation, and learning environment in education.

6. Recommendation

This study suggests that the students would no longer feel limited or disadvantaged by their family background or the local environments in which they were raised. As a result, their upbringing and nearby educational institutions would have a diminished impact on their eventual educational trajectories and achievements. Furthermore, working students often juggle heavy workloads and demanding schedules yet remain eager to learn. They place a high value on personalized, high-quality content that directly addresses their specific needs. However, they are becoming increasingly frustrated and disengaged with content and experiences lacking relevance, quality, and availability when needed. Due to the post-COVID-19 challenges in the current educational landscape, addressing these concerns has become more important than ever.

CRedit authorship contribution statement

Muhammad Imran: Writing – original draft, Validation, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Norah Almusharraf:** Writing – review & editing, Validation, Supervision, Software, Resources, Project administration, Funding acquisition, Formal analysis. **Milana Yunis Abbasova:** Writing – review & editing, Visualization, Validation, Methodology, Formal analysis, Data curation.

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Declaration of competing interest

The authors declare that there is no financial or any other conflict of interest associated to this study.

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The authors followed all ethical guidelines while preparing this manuscript and cited all consulted works. Moreover, the author did not use AI tools to write or correct this manuscript.

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