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Teachers' viewpoint about online teaching: A post COVID-19 scenario

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1. **Abstract:** *The pandemic COVID-19 has affected life in various sectors of society including health, industry and education. Most importantly, the pandemic COVID-19 impacted the education sector. The performance of students in examinations has been severely affected due to COVID-19. Before the outbreak of this bad pandemic, academic activities were usually carried out with face-to-face meetings but during this pandemic, educational sessions have turned into virtual meetings. Various digital applications like Zoom, Google Meet and Skype have been used to facilitate academic proceedings to substitute physical classes. Previously, many researchers documented the impact of online education on students' performance during COVID-19. However, the impacts of online teaching are not well evident on students' academic performance in post COVID era. The research was conducted to evaluate the impact of job before and after COVID-19 on the teachers and for this the population was divided into two categories the young teacher who was recently recruited your appointed and the teachers who have a long teaching experience in the teaching field. In this study, researcher analysed the perception of teachers regarding the pandemic-based online teaching and its implications for student learning in post COVID times. For this purpose, a survey was conducted with secondary school teachers in tehsil saddar district Faisalabad, Punjab, Pakistan. The data was collected through a questionnaire which was designed by keeping in view the objectives of this study. Collected data was analysed by using Statistical Package for Social Sciences (SPSS). The research study found that a majority of the respondents (3.63±1.33) believed that online teaching has made it easier to share reading material quickly. Additionally, most respondents (3.90±1.17) agreed that online teaching saves time and allows students to continue their studies without physically attending school. However, the study als[1]o revealed that (4.10±1.12) a significant challenge faced by teachers while adopting online teaching was internet connectivity issues, which can affect their ability to deliver online lessons effectively. These findings suggest that online teaching has several benefits for both teachers and students, but also highlight the importance of addressing technological challenges to ensure effective implementation of online teaching.*

Keywords: Teachers' perceptions, online teaching, particular attention, Post-COVID adaptation.

2. **Introduction:** Online education is a type of education that allows someone who is unable to attend a traditional educational institution to continue education. Online education saves time and money while allowing you to continue your education while working. The importance of online education became increasingly apparent when the covid-19 brought its adverse effects to the forefront. The corona virus disease-2019 (COVID-19) was declared in Wuhan city of China, in December 2019. To assure the distance measure among peoples, the only proper

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technique to fix the COVID-19 is through social or physical separation. The spread of the COVID-19 epidemic, Educational institutions throughout the world have been temporarily shuttered. Over 91% of the world's student population is affected by educational establishment closures (Yadav, 2020). Online learning has gained popularity, parents, students, college and university administrators, state and Federal Governments, and other groups are reportedly having trouble. It is an issue that education costs are increasing. There are a variety of advantages to offering courses online, including: educational experts think that making certain courses available online would be more economical. There is no need for physical contact between students and instructors in the classroom. People who live in distant places may now enroll in courses that they were unable to do in the past. It could be less difficult for students to squeeze in their study time when they take asynchronous courses. This allows for more flexibility, particularly for non-traditional students who may have obligations to their families or jobs that are different from those of the majority of undergraduate students (Arias *et al*., 2018). To compensate for educational losses caused by the COVID, Government decided to use digital technology for delivering the curriculum in the absence of physical classrooms. For examples, Schools and universities have begun to provide online classes using technological platforms such as Zoom, Google Hangouts and Microsoft Teams. In addition to the platforms mentioned above, some schools were leveraging See Saw, Google Suite and YouTube videos to make online classrooms as interesting as in-person sessions. Furthermore, schools and teachers were striving to make extra efforts to interest students in courses by revising schedules, transferring conversations online, soliciting input from parents and continually monitoring pupils (Thielsch, 2021). Educational institutions have determined that it is necessary to adapt new teaching strategies, exclusively online, to deliver their curriculum content and prevent the Corona virus from spreading due to the COVID-19 and the closure of educational institutes worldwide for fear of contamination. Given how technology has affected people's ability to complete tasks in a variety of ways, it needed to play this crucial role in online teaching and learning. It is now a part of our ever evolving life. Developing relationships between technology, Course content and pedagogy in the learning and teaching environment is a crucial component of online learning. Therefore, in a virtual learning environment where students may take charge of their learning and maximized it in a virtual classroom, E-learning is becoming unavoidable. Now there is need of study were be examined the impact of online teaching on the performance of students after the COVID-19 pandemic (Fawns *et al*., 2021). Studying online as compared to a regular classroom, results in a significant decline in children's learning experiences (attention, engagement, learning capacity, and self-worth from learning) which is linked to a decline in mental health. The problem is exacerbated for those who have trouble using their working memory. More research is needed in this area to decrease the negative impacts of online learning and consequently enhance students' mental health (Simkiss, 2022). Previously many researchers documented the impacts of online education on students' performance in Pakistan. For example: The majority of the students had unfavorable views about their online learning experience owing to concerns with institutional support and guidance, technological help, communication, resource and students' home study environment. Similarly, the students' perceptions on the switch to full-time online forums are important since they play a crucial role in online learning. However, the impact of online teaching and its repercussions in post-COVID are not well evident. In order to bridge the gap, I examined the impact of online teaching and teacher perceptions toward the students' academic performance in post-COVID (Amir, 2022). There is a significant decline in students' learning experiences (attention, engagement, learning capacity, and self-worth from learning) as compared to their regular classroom experience, which is associated with a decline in mental health. It was be substantially more difficult for those who have trouble with working memory. More research is needed in this area to reduce the negative impacts of online learning and thereby enhance

students' mental health. As a result of significant school closures caused by the COVID-19 epidemic in 2021, many students utilized online learning platforms to complete their education (Thomas Walters, 2021). Students now have quick access to information and may choose how they learn thanks to technology and the internet. Traditional teaching and learning methods are no longer as successful at engaging pupils as they once were since they are no longer the sole source of information for them. In fact, 90% of respondents say they get their information mostly from the internet. The new role of the instructor is to support his students' learning and act as a mentor to them. He should not only aid students in learning, but also inspire them to question, reflect, and voice their thoughts. Higher education institutions pounced at the possibility to utilize it as their primary teaching medium, which is another element in the popularity of online learning. As a consequence, it took the conventional course and current learning process and established the e-learning idea. The inclusion of online education into the curriculum caused a variety of issues for instructors, curriculum designers, and administrators. These issues included everything from the technical setup to online instruction and assessment. Is the present IT infrastructure capable of supporting this integration? What topics need to be included in the course, and how must they be taught? Which efficient pedagogy ought to be applied? How should education be assessed? What effects do online courses specifically have on students' performance? (Joshi, 2012).

2.1. History of pandemic regarding online learning: The WHO confirmed the occurrence of a global coronavirus pandemic on March 11, 2020. In an effort to stem the tide of the pandemic, face-to-face classes were cancelled all around the world and social seclusion was enforced. Schools were closed for more than 90% of the world's pupils. Modifications to teaching methods were a foregone conclusion following the shutdown of HEIs. So-called emergency remote teaching is the result of decades of research into digital education, government and institutional rules, and the process of rapid adaptation to an education system in which pupils and teachers are geographically separated. Putting a school or university's curriculum online (E-learning) entails more than just moving classes and classrooms off-campus. E-learning, in its broadest sense, entails a pedagogical redesign of a course and the construction of social and cognitive interaction systems online, in addition to the physical distance between individuals involved in the training process. In contrast, virtual classrooms typically use tried-and-true methods of instruction without considering how they might evolve in a digital setting (Hodges *et al*., 2020).

2.2. Online Education: In the last two decades, more and more students have chosen to complete their educations online. With the recent spread of COVID-19, online education has emerged as the dominant paradigm. The research literature on online education from 2009 to 2018 was reviewed systematically. Researchers looked at publishing patterns, study themes, research techniques, and contexts in a systematic review of 619 articles on online education. They pointed out that whereas online learner features had received a lot of attention, classroom and organizational levels and instructor characteristics had received far less. Recent studies have found success in incorporating VR and other technology into online education. A poll looked at how well virtual reality and internet education work together. Virtual reality technology allows students to practice their newfound skills in a realistic setting, and online education systems make up for lost classroom time. Hedge *et al.*, (2021) claimed that results of these evaluations indicated that both students and teachers liked using the modules in their classes. Research into the benefits of online education continues to expand. The efficacy, potential, and problems of online education were investigated through a literature study. Both online and on-campus students performed similarly and reported high levels of satisfaction with their education. A study analyzed face-to-face education before the COVID-19 pandemic and online instruction after the epidemic using data from two large-scale examinations in representative primary and secondary schools in China before and after the epidemic. The

results showed that the academic performance of 106 pupils in elementary and secondary schools was much higher before the pandemic than after. Rural communities were hit harder by online education than urban ones; the divide between city and country students grew even wider as a result of this trend. More research on online education's efficacy is required, as are enhancements to infrastructure and faculty.

2.3. Teacher perception regarding remote teaching of post-COVID: The purpose of this research is to examine faculty attitudes towards emergency remote teaching in a Portuguese higher education setting. Therefore, the goals of this paper are to:

- Understand how teachers feel about remote learning in the wake of the COVID-19 pandemic.
- Determine how teachers feel about the e-learning tools they've been using.
- Determine how teachers feel about the distance assessment strategies they've been using.
- Differentiate teacher profiles based on how they feel about the overall evaluation of the lessons in remote learning and the evaluation of the assessment.

Online physical education (OLPE) has become increasingly popular as a means for secondary school students to fulfil their PE credit requirements. There is still some debate on whether or not OLPE is useful and of high quality. Less than half of U.S. states (19 out of 44) require trained teachers to teach OLPE, according to SHAPE America (2016), while about 40 states allow individuals to teach OLPE before they are certified to teach PE. Daum and Buschner (2012) concluded that OLPE typically provides scant information, with most sites devoted solely to fitness and wellbeing, weight training, or a single sport (like golf). In addition, pupils should be motivated to increase the amount of time they spend being physically active through physical education. None the less, they also found that the vast majority of OLPE courses at the secondary level fell short of meeting the recommended amount of time allocated to physical education. Online physical education was associated with 8% lower levels of physical activity in students compared to traditional PE, according to research by Hager and colleagues in 2012. Individuals' perspectives are formed and modified through critical introspection, growth, and new learning opportunities, according to the notion of transformative learning. In the late 1970s, Jack Mezirow created the theory of transformative learning. It originated from his research on how college affects women in terms of career discovery and management. Since then, researchers in fields as diverse as education (Henderson, 2010) has expanded upon and applied the theory.

2.4. Teachers' Perceptions and Challenges Post COVID Situation: Problems with online education have been identified on a technical, pedagogical, and social level. The quality and accessibility of students' internet connections and the availability of the requisite gear are two examples of technological barriers. Challenges in education can be broken down into four categories: a lack of engagement and motivation among students and teachers, a lack of digital competence among both groups, and a lack of teachers' ability to handle online resources and build digital learning environments. Finally, students may struggle socially due to factors such as a lack of peer or adult interaction, poor home learning environments, or unsupportive parents (Ferri *et al*., 2020).

2.5. Need of the study: The pandemic COVID-19 has affected life in various sectors of society including health, industry and education. Most importantly, the pandemic COVID-19 impacted the education sector. The performance of students in examinations has been severely affected due to COVID-19. Before the outbreak of this bad pandemic, academic activities were usually carried out with face-to-face meetings but throughout this pandemic, educational sessions have turned into virtual meetings. Various digital applications like Zoom, Google Meet and Skype have been used to facilitate academic proceedings to substitute physical classes. Previously, many researchers documented the impact of online education on students' performance throughout COVID-19. However, the impacts of online

teaching are not well evident on students' academic performance in post COVID era. In this study, researcher was analyzing the perceptions of teachers regarding the pandemic-based online teaching and its implications for student learning in post-COVID times.

3. **Methods and Materials:** The process of action or performing, or the research or planning stage, is the experience stage. The analytical period is the phase where the research connects with the study purposes, followed by the communication period, which is the period in which the research report is written. The research methodology explains the approach used to carry out this research. This section included the study's area, target population, sampling technique and size of the sample, the design of the research, research tools, tool validation, instrument reliability, collecting data procedures, and data analysis (Ghauri, 2005).

3.1. Nature of research: In this study, a descriptive survey design was adopted. It is used for data collection and the systematic description of the characteristics of a certain population. The design is deemed adequate since it allowed the researcher to discover the population objectivity feature. A research design is a methodical approach to conducting a study on any issue. It was a study that was quantitative in nature. For the final stage of the research, all of the research findings and results were quantified.

3.2. Quantitative research: Quantitative researchers related to the problems that can be numerical collected and then analysed statistically. Mostly quantitative research is used to measure behaviour, ideas, attitudes and facts of current society. Data collection tool that was used to quantitative research design is questionnaire.

3.3. Research design: A descriptive research presents the characteristics of the target population in a methodical manner. The design is deemed adequate because it allowed the researcher to detect population characteristics. In this study, a descriptive survey design was adopted. It is used to collect data and describe the characteristics of a specific population in a systematic manner. The design is deemed adequate because it allowed the researcher to objectively identify population characteristics.

3.4. Target population: The target population is a hypothetical group of individuals, objects, or events in which the researcher wishes to generalize the study's findings. A population is a set or collection of all potential observations, finite or infinite, that are relevant to some characteristics of interest. A study's population is the group (typically of individuals) from which researchers hope to draw conclusions. Population is a collection of all units that the research includes or to which it can be generalized; population is the area in which the researcher will perform the investigation (Nathan, 2017). There were 498 teachers in secondary schools of city Faisalabad, who were considered as target population.

3.5. Sample size: A sample is a small subset of a larger population. Sampling allows researchers to conduct studies on samples rather than the entire universe, which saves money and time. This technique has been used because it includes a large number of populations at random or by selecting subgroups of populations" (Messick, 2006). Sample size of 141 male teachers has been draw by using www.surveysystem.com with a confidence interval of 5% and a confidence level of 95%.

3.6. Development of the instrument: Developing a questionnaire used to be a very tough commitment. With the research aims in mind, a well-designed questionnaire was created for data collection by learners. This chapter discusses the research's sampling strategy and methodology. The researcher selected the questionnaire schedule as the most typical approach to data collection (Lewis, 2005). This study's respondents' data were collected using a well-structured questionnaire. The study used a questionnaire to collect data for quantitative research. It is a vital technique to get perception and vision from respondents about education and other critical challenges by understanding the experiences of those whose lives are affected by these difficulties. Researcher used a Likert scale (1=Strongly disagree, 2=Disagree, 3=Neutral/Undecide, 4=Agree, 5=Strongly agree).

3.7. Validity of the Instrument: Validity refers to the number of outcomes that can be obtained from an analysis of information. It really points to the wonder that is being discussed, investigated, and explored. Overall, validity reflects how good your study is, especially when it is applied to research and research methodologies. Validity is a specific technique of data gathering that accurately represents the phenomenon that we are attempting to measure because facts are reliable assumptions (David and Bhrnstedt, 2010).

3.8. Reliability of the Instrument: The consistency of the item being evaluated is related to its dependability. When something is tested frequently, it is said to be reliable (Maxwell, 2016). The pretesting was an experiment to see how reliable the research tools were. During the pretesting stage, data from 6 respondents (teachers) was collected to ensure the internal consistency of the study tool (questionnaire). The pretesting and trial testing showed that the research tool for this study was reliable, indicating that it was appropriate for the research.

3.9. Study Assumptions: Data were gathered rapidly from a large number of respondents and all respondents were quite cooperative with the researcher and assisted her in data collecting.

3.10. Problems faced by the researcher during data collection: It was difficult for the researcher to obtain clearance to collect data due to various safety concerns; population was made up of teachers who were overworked. Data collection used to be a difficult task and the study was mostly focused on a form of questionnaire that can reveal concealed details about their professors. As a result, it was extremely difficult to ensure that records would be kept confidential.

3.11. Study limitation: Respondents were only from secondary schools of saddar Faisalabad. The present study only focused on “Teachers’ viewpoint about online teaching among secondary schools in tehsil saddar, district Faisalabad and data were collected through questionnaire assuming that they had provided correct information.

4. Results and discussions: This section explains in detail the results used in this descriptive study. The most important step in scientific research for drawing conclusions is data analysis or interpretation. Without these steps, generalization and prediction, which are the goals of scientific research, cannot be achieved. The characteristics of the respondents' attitudes toward the phenomena under investigation are used to draw generalizations and conclusions.

4.1. Demographic attributes: There are so many definitions of the term "demographic". Hoyle (2001) suggested that demographic was categorized into three dimensions: education level, economic status, and position of profession. This present study's demographic characteristics refer directly to teachers'. Teachers' demographic characteristics is most commonly determined by combining their age, residence, level of academic education, professional education, and income. There is no one dimension to demographic characteristics; rather, they are a collection of attitudes that are interconnected. In order to identify a person's demographic characteristics, it is important to look at the average cultural procession, the person's effective income, their material procession, and their involvement in community activities. Demographic traits were evaluated using the following factors: Each society has its own unique set of norms and beliefs that influence how it produces demographic features; thus, demographic characteristics are made up of a range of components. Consequently, demographic characteristics of the respondent's family became an independent variable in the study.

4.2. Perceptions towards online teaching as a result of post COVID adaptations: The COVID-19 pandemic necessitated a swift shift towards online teaching, leaving a lasting impact on perceptions and attitudes towards this mode of education. Initially met with skepticism and resistance, the adaptations made during this period have challenged preconceived notions and transformed perceptions of online teaching. As educators and students embraced virtual classrooms, they discovered the immense potential and flexibility that online platforms offered. The experience of seamless connectivity, the ability to access educational resources from anywhere, and the convenience of asynchronous learning have

gradually eroded skepticism and fostered a more positive outlook towards online teaching. Moreover, the growing body of research highlighting the efficacy of well-designed online courses and the use of engaging multimedia tools has provided further validation for this mode of education. As we emerge from the pandemic, the adaptations made during this challenging period have left an indelible mark, reshaping perceptions towards online teaching and establishing it as a viable and valuable alternative to traditional in-person instruction.

Table 1: Distribution respondent in term of perceptions towards online teaching

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Sr.	Perceptions towards online teaching	Mean	S.D	Remarks
1.	Online teaching has made it easy for quick share of reading materials.	3.63	1.33	Agree
2.	Students are now able to learn through online teaching.	3.59	1.32	Agree
3.	Teachers feel confident in their ability to design and deliver lessons in post COVID times.	3.55	1.33	Agree
4.	Students are now more able to provide quick feedback though online teaching.	3.52	1.36	Agree
5.	Online teaching has provided flexibility in term of time and space.	2.95	1.12	Neutral
Overall remarks				Agree

Discussion: Study findings shown in table 1 found that the majority of the respondents reported that "online teaching has made it easy for quick share of reading materials" (3.63±1.33), "students are now able to learn through online teaching" (3.59±1.32), "teachers feel confident in their ability to design and deliver lessons in post COVID times" (3.55±1.33) and "students are now more able to provide quick feedback though online teaching" (3.52±1.36) were perception regarding online teaching.

4.3. Factors that influence the perceptions of the teachers towards online teaching: Several factors can shape teachers' perceptions of online teaching. Liu *et al*., (2020) highlighted that technological competence play a crucial role in influencing teachers' attitudes towards online instructions. Teachers who possess a higher level of technological proficiency and experience are more likely to have positive perceptions of online teaching. Additionally, the availability of adequate resources, such as instructional materials and technological support, significantly impacts teachers' perceptions. Teacher training and professional development programs specifically focused on online pedagogy have been found to positively influence teachers' attitudes and perceptions of online teaching (Abdous *et al*., 2020). Furthermore, factors like institutional support, administrative policies, and the level of autonomy given to teachers in designing online courses can also impact their perceptions and attitudes towards online teaching (Kim & Frick, 2011). These factors interact in complex ways, and understanding them can help inform the development of effective strategies for supporting teachers in their transition to online instruction.

Table 2: Distribution of respondents according to social factors that influence the perceptions of the teachers

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Sr.	Factors that influence the perceptions of the teachers	Mean	S.D	Remarks
1.	Online teaching save time and student can continue studies without coming school.	3.90	1.17	Agree
2.	Online teaching provides greater flexibility for students to learn at their own place.	3.72	1.37	Agree

3.	Online teaching helps teachers to reach out students in the short time.	3.64	1.37	Agree
4.	Online teaching helps teachers to utilize the time effectively.	3.62	1.35	Agree
5.	Teachers can access students' at distant locations.	3.59	1.45	Agree
6.	The lack of face to face interaction in online teaching can lead to feelings of isolation among students.	2.80	1.27	Neutral
Overall remarks				Agree

Discussion: Study findings shown in table 2 found that the majority of the respondents reported that "online teaching save time and student can continue studies without coming school" (3.90±1.17), "online teaching provides greater flexibility for students to learn at their own place" (3.72±1.37), "online teaching helps teachers to reach out students in the short time" (3.64±1.37) and "online teaching helps teachers to utilize the time effectively" (3.62±1.35) were factor that influence the perception of the teachers regarding online teaching.

4.4. Managerial and Technological factors: Managerial and technological factors play significant roles in shaping perceptions of online teaching. Joo *et al*., (2020) concluded that the importance of managerial support in fostering positive attitudes towards online teaching among instructors. Effective leadership, clear communication, and institutional policies that prioritize online education can create a supportive environment and enhance instructors' confidence and satisfaction. Technological factors, such as the availability of user-friendly and reliable online learning platforms, can also influence perceptions. Chen et al., (2020) suggested that teachers' satisfaction with the usability and functionality of the technology used in online teaching positively correlates with their overall perception of online instruction. Providing adequate training and technical support is crucial to alleviate technological challenges and ensure that instructors can effectively navigate and utilize online tools. By addressing these managerial and technological factors, educational institutions can help cultivate a positive perception and acceptance of online teaching among instructors.

Table 3: Distribution of respondents according to managerial and technological factors
(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Sr.	Managerial and technological factors	Mean	S.D	Remarks
1.	Teachers need to prepare more in online teaching as compared to traditional teaching.	4.09	1.10	Agree
2.	Teachers have difficulty keeping their students involved throughout the session.	3.94	1.22	Agree
3.	Teachers are supported and encouraged by institution to use online teaching method.	3.90	1.20	Agree
4.	Teachers find it difficult to motivate their students in online session.	2.79	1.24	Neutral
Overall remarks				Agree

Discussion: Study findings shown in table 3 found that the majority of the respondents reported that "teachers need to prepare more in online teaching as compared to traditional teaching" (4.09±1.10), "teachers have difficulty keeping their students involved throughout the session" (3.94±1.22) and "teachers are supported and encouraged by institution to use online teaching method" (3.90±1.20) were managerial and technological factor that influence the perception of the teachers regarding online teaching.

4.5. Challenges faced by the teachers while adapting to online teaching: Teachers encounter various challenge when transitioning to online teaching. Hodges *et al*., (2020) identified several common difficulties. First, teachers may face technological challenges, including limited access to reliable internet connections and unfamiliarity with online platforms and tools. Second, adapting instructional strategies for an online environment can be demanding, requiring teachers to rethink lesson planning, student engagement, and assessment methods. Third, maintaining student motivation and active participation in virtual classrooms can be challenging without face-to-face interactions. Additionally, the absence of immediate feedback and difficulty in gauging student comprehension pose additional hurdles. Finally, teachers may experience increased workload and time management challenges as they navigate the complexities of online instruction. Addressing these challenges necessitates comprehensive support systems, training programs, and resources to help teachers effectively adapt to online teaching environments.

Table 4: Distribution of challenges faced by the teachers

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Sr.	Problem associated while adopting to online teaching	Mean	S.D	Remarks
1.	Internet connection is not always stable which affects students' ability to deliver online lesson.	3.97	1.4	Agree
2.	Students were not ready to attend online classes.	3.86	0.77	Agree
3.	Online teaching requires additional technological skills that majority of students did not have before.	3.67	1.32	Agree
4.	Online has affected my ability to maintain a work life balance.	3.57	1.41	Agree
5.	Online assessment of the students is difficult for the teachers.	2.74	1.24	Neutral
Overall remarks				Agree

Discussion: Study findings shown in table 4 found that the majority of the respondents reported that "internet connection is not always stable which affects students' ability to deliver online lesson" (3.97±1.4), "students were not ready to attend online classes" (3.86±0.77) and "online teaching requires additional technological skills that majority of students did not have before" (3.67±1.32) were major problems that associated while adopting to online teaching.

4.6. How teachers cope with challenges while adapting to online education: Teachers employ various strategies to cope with challenges while adapting to online education. Foulger *et al*., (2020) claimed that professional development and training opportunities specifically focused on online teaching can enhance teachers' coping mechanisms. Engaging in online pedagogy workshops, webinars, and collaborative learning communities allows teachers to acquire new skills, exchange ideas, and seek support from peers. Additionally, leveraging technology resources and support from instructional technology specialists can help teachers navigate technical challenges and effectively utilize online platforms and tools. Building a strong online teaching community, where teachers can share experiences, strategies, and resources, can also foster resilience and collaboration. Furthermore, taking a student-centred approach, incorporating interactive and engaging instructional techniques, and providing regular communication and feedback contribute to maintaining student motivation and active participation in the online learning environment. By utilizing these coping strategies and resources, teachers can navigate the challenges of online education and deliver effective and engaging instruction.

Table 5: Distribution of challenges while adapting to online education

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Sr.	Challenges while adapting to online education	Mean	S.D	Remarks
1.	Teachers use broadband internet connection to overcome the problem of connectivity.	3.94	1.1	Agree
2.	Teachers learn additional technological skills.	3.82	0.71	Agree
3.	Teachers motivate students toward online teaching.	3.71	1.11	Agree
4.	Teachers learn to prepare online content and disseminate it through social media.	3.65	0.85	Agree
5.	Teachers may use microphone and camera for conducting online examinations.	3.61	1.18	Agree
6.	Teachers use recorded videos to conduct practical sessions.	3.55	1.07	Agree
7.	Teachers record advance lecture for work-life balance.	3.15	1.87	Neutral
Overall remarks				Agree

Discussion: Study findings shown in table 5 found that the majority of the respondents reported that "teachers use broadband internet connection to overcome the problem of connectivity" (3.94±1.1), "teachers learn additional technological skills" (3.82±0.71), "teachers motivate students toward online teaching" (3.71±1.11), "teachers learn to prepare online content and disseminate it through social media" (3.65±0.85) and "teachers may use microphone and camera for conducting online examinations" (3.61±1.18) were major challenges while adopting to online teaching.

4.7. Level of proficiency with different online teaching tools: The level of proficiency with different online teaching tools varies among educators. Archambault *et al.,* (2020) declared that teachers' familiarity and comfort with online teaching tools can impact their effectiveness in the virtual classroom. Some teachers may have a high level of proficiency and confidence in using a range of tools, such as learning management systems (LMS), video conferencing platforms, interactive whiteboards, and multimedia resources. These educators may leverage these tools effectively to enhance student engagement, collaboration, and instructional delivery. However, there is variability among teachers regarding their level of proficiency with specific tools and platforms. Some educators may require additional training and support to develop the necessary skills and confidence in using online teaching tools. By providing comprehensive professional development opportunities, ongoing training, and access to user-friendly resources, educational institutions can support teachers in improving their proficiency with different online teaching tools.

Table 6: Distribution of proficiency with different online teaching tools

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Sr.	Proficiency with different online teaching tools	Mean	S.D	Remarks
1.	Micro Soft Team	3.94	0.41	Agree
2.	WhatsApp	3.81	0.61	Agree
3.	Google Meet	3.62	1.27	Agree
4.	Google Translator	3.55	0.9	Agree
5.	Zoom Meeting	3.52	0.93	Agree
6.	Web whiteboard	3.08	1.1	Neutral
Overall remarks				Agree

Discussion: Study findings shown in table 6 found that the majority of the respondents reported that "Microsoft team" (3.94±0.41), "WhatsApp" (3.81±0.61), "Google meet" (3.62±1.27), "Google translator" (3.55±0.9) and "Zoom meeting" (3.52±0.93) were different online teaching tools for online teaching.

4.8. To compile suggestions on the bases of research and finding for future studies: To compile suggestion based on research findings for future studies, a comprehensive review of existing literature is essential. By synthesizing the findings of multiple studies, researchers can identify knowledge gaps and areas for further investigation. For instance, future studies could delve into the long-term effects of online teaching on student learning outcomes, examine effective strategies for promoting student engagement and motivation in virtual classrooms, explore the impact of various instructional design approaches in online education, and investigate the factors influencing the professional development needs of teachers transitioning to online teaching. Moreover, researchers can explore the effectiveness of different technological tools and platforms in supporting online instruction and assess the impact of socio-cultural factors on the success of online learning environments. By conducting rigorous research in these areas, educational stakeholders can gain insights and evidence-based recommendations to enhance the quality and effectiveness of online teaching in the future.

Table 7: Distribution of suggestion responded by respondent on the basis of research and finding for future studies

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Sr.	Suggestions on the bases of research and findings	Mean	S.D	Remarks
1.	Teachers should create a supportive and inclusive online learning environment where students feel comfortable asking questions and seeking help.	3.91	2.02	Agree
2.	Teachers should provide students with additional resources like video lectures, online tutorials, and practice questions to help them reinforce their learning outside of class.	3.85	1.78	Agree
3.	Teachers should use interactive tools like online whiteboards, polls, and quizzes during math classes to keep students engaged and enhance learning.	3.79	2.27	Agree
4.	Teachers should use a variety of teaching strategies like group discussions, individual assignments, and problem-solving exercises to cater to the diverse learning needs of students.	3.71	1.78	Agree
5.	Teachers should establish clear expectations and guidelines for class behaviour and academic performance to promote a sense of accountability among students.	3.65	3.01	Agree
Overall remarks				Agree

Discussion: Study findings shown in table 7 found that the majority of the respondents reported that "teachers should create a supportive and inclusive online learning environment where students feel comfortable asking questions and seeking help" (3.91±2.02), "teachers should provide students with additional resources like video lectures, online tutorials and practice questions to help them reinforce their learning outside of class" (3.85±1.78), "teachers should use interactive tools like online whiteboards, polls, and quizzes during math classes to keep students engaged and enhance learning" (3.79±2.27), "teachers should use a variety of teaching strategies like group discussions, individual assignments, and problem-solving exercises to cater to the diverse learning needs of students" (3.71±1.78) and "teachers

should establish clear expectations and guidelines for class behaviour and academic performance to promote a sense of accountability among students" (3.65±3.01) were suggestions on the basis of findings for online teaching.

4.9. Compare views of teachers toward online teaching before and after COVID-19

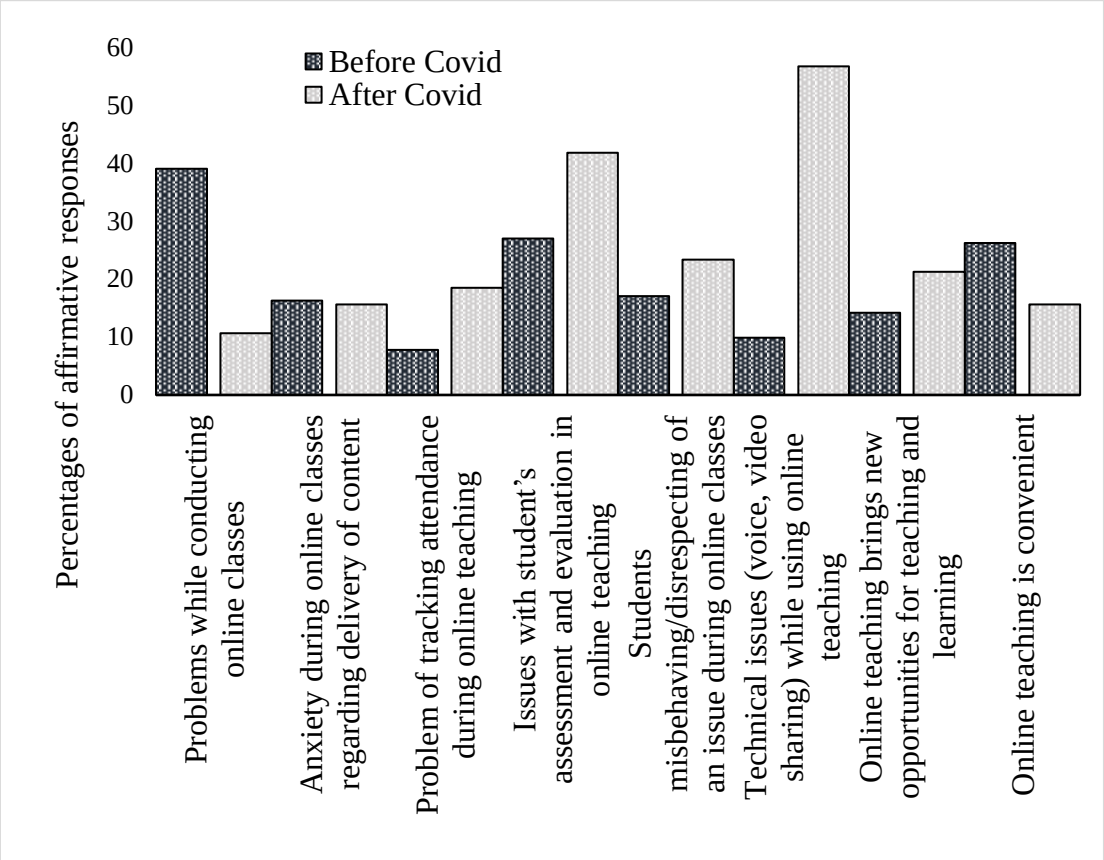

Figure 1: Percentage of affirmative responses regarding views of teachers toward online teaching before and after COVID-19

Discussion: Above figure shows the views of teachers towards online teaching before and after the COVID-19 pandemic. The results revealed several notable changes in teachers' perceptions before and after the pandemic. The decreased affirmative responses from 39% to 31% ~ regarding the statement about experiencing problems while conducting online classes shows that teachers had less issues with online teaching after the COVID. This highlights that the pandemic has transformed their abilities to regulate online classes. Similarly, another interesting pattern was increase in affirmative responses from 26% to 41.8% regarding the statement on teachers' having more issues with students' assessment and evaluation after the COVID. This might be associated with change in learning environment from virtual to physical settings, making it complex to precisely gauge students' comprehension for assessment of their progress. The quite increase in affirmative responses from 9.93% to 56.7% regarding the statement about often experiencing technical issues (voice, video sharing) while conducting online teaching after COVID could be attributed to enhanced use of online teaching tools in post-COVID settings, which was not as essential before the COVID. Albeit relatively low, the decrease in affirmative responses from 26.2% to 15.6% regarding the statement about convenience of online teaching in post-COVID shows that teachers were not satisfied about ease with online teaching. This could be related with issues of connectivity and learning of additional technological skills as reported in Table 5. Overall,

the findings highlight the need for ongoing support and professional development for teachers as they navigate the online teaching landscape.

5. **Recommendation:** If feasible, consider broadening the participant pool to include both male and female teachers to get a more comprehensive understanding of teachers' perceptions. Include a range of different types of schools in the study, such as urban and rural, public and private, to understand if and how these contexts impact teachers' perceptions of online teaching. Analyze if the subject matter taught impacts teachers' perceptions about online teaching. Some subjects might be more adaptable to the online format than others. Examine the training and support provided to teachers to switch to online teaching, and how this affects their perceptions and effectiveness in the post-COVID era. Look into the technical infrastructure available to teachers, such as internet access and digital devices, as this could significantly impact their ability to deliver effective online teaching. Although the study focuses on teachers' perceptions, consider incorporating student feedback to understand how their experiences with online teaching align or differ from teachers' perceptions. Consider looking at the long-term impact of online teaching on teachers' professional development and job satisfaction. Based on the perceptions and experiences shared by teachers, suggest potential strategies for improving online teaching in the post-COVID era. Highlight case studies of teachers who successfully adapted to online teaching. This could provide valuable insights and practical strategies that others can adopt. Evaluate how local or national education policies have impacted the transition to online teaching, and what changes could be implemented to better support teachers in the future.
6. **Conclusion:** The study emphasized the importance of professional development opportunities and support systems for teachers in effectively adapting to online teaching. It highlighted the need for continuous training, access to reliable technical resources, and collaborative platforms for teachers to share best practices and learn from one another. Furthermore, the study underscored the significance of student feedback in shaping the future of online teaching. Understanding students' experiences, challenges, and preferences is vital in refining instructional strategies and designing effective online learning environments. Incorporating student feedback in the ongoing development and evaluation of online teaching practices can help bridge the gap between teachers' perceptions and students' needs. The findings of this study have implications for educational policymakers and school administrators in devising strategies to enhance the quality and effectiveness of online teaching. It calls for investments in infrastructure, training programs, and supportive policies that prioritize the well-being of teachers and students alike. Additionally, the study emphasizes the importance of creating a conducive online learning environment that fosters student-teacher interactions, collaboration, and personalized support. In conclusion, this analysis of teachers' perceptions regarding online teaching in the post-COVID era provides valuable insights into the challenges, strategies, and potential improvements required for successful implementation of online education. By addressing the identified issues and incorporating the perspectives of teachers and students, educational stakeholders can shape a future where online teaching becomes an integral and effective component of the educational landscape.
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