




# Online synchronous learning through video conferencing: Perceptions and challenges of pre-service teachers

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## ABSTRACT

This research aimed to examine the extent to which pre-service teachers utilize video conferencing applications for learning purposes. It further sought to find the most used applications for video conferencing and the challenges that pre-service teachers are confronted with in the use of video conferencing for lectures. A multi-stage sampling method was employed to choose 340 participants for this research. A questionnaire and interview guide facilitated the collection of both quantitative and qualitative data for the study. The quantitative data was analyzed using frequency, percentages, mean, standard deviation, independent sample t-test, and one-way ANOVA, while the qualitative data was analyzed using content analysis with narrative discussion. The study found that most pre-service teachers mostly used the Zoom app for live video conferencing. However, the lack of internet data bundles remained the major challenge for students when they engaged in online video conferencing. Furthermore, the study revealed no significant difference in the readiness for online synchronous video conferencing lectures with respect to gender, age, and program of study. The study recommended the creation of academic online communities for every semester course and the institution of a minimum number of hours of online video conferencing for every semester course to promote blended learning in colleges of education. In light of the findings, practitioners do not require additional eLearning expertise and separate tools to implement online synchronous video conferencing lectures based on these demographic variables.

**Keywords:** online synchronous learning, video conferencing, emergency remote teaching, post-COVID, preservice teachers

## INTRODUCTION

Web-based instruction for educational purposes is extensively utilized and growing quickly and a number of universities and distance education institutions have developed courses for instruction via the web. Bouchamma et al. (2021) found that the COVID-19 pandemic has further accelerated the adoption of web-based and online learning modalities across various educational settings, with institutions increasingly leveraging digital technologies and remote instruction to ensure continuity of learning. Some of these institutions use synchronous, real-time technologies like video conferencing. Others are mainly asynchronous. In March 2020, almost all the world's schools had shut down. A number of governments, including Panama, El Salvador, Bangladesh, Bolivia, the Philippines, and Venezuela, declared nationwide school closures due to the deadly coronavirus pandemic (UNICEF, 2021). Consequently, 185 countries closed their educational institutions, impacting 91% of the world's students. The sudden closure of these learning institutions and the rapid move to distance learning had little time for planning or reflection on the use of web-based approaches for instruction (Winthrop, 2020). The pandemic also exposed the world's unpreparedness for virtual or online learning. In Africa, most higher institutions hurriedly responded to unexpected events that compounded their existing challenges. Universities, encouraged but not mandated to adopt online teaching to maintain academic progress, faced significant challenges including limited budgets, operational inefficiencies, underdeveloped technological infrastructure, and a weak capacity for internal fundraising. Among all regions, African universities were the least equipped to handle virtual classrooms effectively (Adarkwah, 2021). On the contrary, eLearning formed an integral part of education in most developed countries (Hallberg, 2017).

Synchronous and asynchronous learning are the two major categories of eLearning. Asynchronous modes include self-paced online courses, discussion forums, discussion groups, and message boards. Synchronous modes include virtual classrooms, chats, webinars, application sharing, instant messaging, audio conferencing, and video conferencing. The demand for video conferencing in education has skyrocketed, transforming student engagement with coursework. Live video classrooms unlock new possibilities and promote greater accessibility in education. Wolf (2017) lists some advantages of live streaming in education. This includes the fact that live streaming offers interactive experiences for students. Thus, learning from live streams is an entirely different experience compared to traditional classes. Traditional classes are not always the best environment, as the teacher cannot really focus on every student. Finally, live streams or recorded videos offer students an opportunity to revisit the lessons at their own convenience and are accessible to all learners.

In spite of the fact that Ghana has a high mobile penetration Ghanaweb (2018), it continues to face challenges with eLearning and the application of ICT in various fields in general. Research indicated that students at the University of Ghana prefer to use Facebook, and it is one of the most visited social networking sites by students. An important part of Facebook is live video, which is trending among the youth. Recent research shows that Facebook users today consume more video content daily (Kuchta & Miklošik, 2017). Apart from Facebook, Ghanaian tertiary students use a plethora of online applications for communication and socialization as well as for academic purposes. A study by Aheto-Domi et al. (2021) revealed that Colleges of Education (CoEs) use applications like Google Classroom, WhatsApp, Edmodo, Telegram, and other applications for eLearning. However, internet connectivity issues, accessibility issues, poor time management, adaptability challenges, technical support issues, high cost of internet bundles, and problems with smart devices are some of the challenges students face when they engage in online learning. Gyane (2021), in research titled "Online teaching and learning – the voice of teachers in the colleges," has also noted that WhatsApp, Facebook Messenger, Google Classroom, YouTube, and other platforms are used for some form of eLearning in colleges of education in Ghana. However, students tend to have a negative attitude towards both using video-conferencing in the class themselves and having video-conferencing in their classes at the university (Hodges et al., 2020). Hodges et al. (2020) found that while the use of video conferencing for

remote learning increased significantly throughout the COVID-19 pandemic period, substantial proportion of students indicated that they had challenges with technical issues and reduced engagement. Moreover, a good number of them preferred in-person instruction as compared to virtual learning environments. In a developing nation like Ghana, it is unclear how prepared pre-service teachers are to use video conferencing in formal academic contexts. Consequently, the purpose of this study was to ascertain how prepared pre-service teachers are to utilize video conferencing in formal academic settings in colleges of education in Ghana. It also sought to investigate the specific barriers and facilitators that shaped remote teaching and learning in colleges of education, especially during the COVID-19 era. Understanding the unique difficulties faced in this context is crucial for informing policies and approaches to strengthen the resilience and adaptability of higher education systems in the face of future disruptions. Identifying the gaps and successes can provide valuable insights to improve distance and online learning capabilities in colleges of education in Ghana and beyond going forward.

## LITERATURE REVIEW

### The Effect of Video as a Learning Tool

Online live video interaction helps learners get a chance to interact face-to-face with their teachers online. There are many live video stream tools available for teaching and learning. YouTube, Facebook, Zoom, and Google Meet are some of the tools that provide online live streaming for teachers and learners. Numerous studies have been undertaken to determine the importance of video as an effective learning tool. Borup et al. (2015) posit that video is used to support practical and conceptual teaching. Video allows learning to take place anywhere at any time (Stöhr, 2017). Video streaming is delivering content to expansive audiences and enabling learners to access it in real-time or on-demand (Bates, 2018). Live video streaming will have all the advantages of using video for teaching, however, live video streaming also comes with certain challenges, including high-speed internet accessibility, affordable data bundles, and multimedia-compatible devices. Access to these remains a challenge in many developing nations.

### Online Readiness and Access

In the 21st century, digital learning modalities have become a fundamental element of post-secondary education. Leveraging the capabilities of online instruction has enabled higher education institutions to experience growth in student enrolment without the associated strain on their primary campus resources and facilities (Tetteh-Richter, 2015). Digital learning modalities offer students a range of valuable advantages, including the convenience of accessing course content on their own schedule as well as the flexibility to balance their studies with other commitment (Poole, 2000). Adedoyin and Soykan (2020) found that while the COVID-19 health crisis has expedited the integration and widespread implementation of virtual and distance-based instructional models across post-secondary institutions, many students reported challenges with self-regulation, access to technology, and adaptation to the online learning environment. Deschacht and Goeman (2015) have alluded to key features that determine the readiness of students for online delivery. They include the confidence of students in using electronic communication as a learning tool, students' preference for online method of delivery, as compared to face-to-face teaching in the classroom, and the capacity to participate in self-directed learning.

Other studies have suggested that social engagement, academic abilities, technological abilities, learner motivation, time and research support, costs and internet connectivity, and technical difficulties influence student connectivity to online resources (Arthur-Nyarko & Kariuki, 2019). The unavailability of affordable internet data bundles and limited networks are among the chief factors that influence the capacity of Ghanaian students access and preparedness to engage in live video lectures.

## Effects of Age, Gender, and Program of Study on Acceptance of Video Streaming

Teacher efficacy, user age, gender, and study program are other characteristics that enable live video streaming of preservice teachers (Letseka et al., 2018). For instance, research by Dhawan et al. (2021) demonstrates how teachers' perceptions of students' use of video conferencing are influenced by gender stereotypes. Other studies on video conferencing, Almaiah et al. (2020) found similar trends, with males perceiving video conferencing as more useful and easier to use. However, additional scholarly investigation will be required to verify these findings specifically for Ghanaian students. Another important factor is age. Age might significantly impact curricula and instructional strategies teachers use (Francis et al., 2019). Younger students are generally considered more adaptable to new technologies (Culp-Roche, et al., 2020). Studies on video conferencing use, for example, Almaiah et al. (2020) support this, suggesting younger students find it more useful and have a higher intention to use it compared to older students. A student's program of study can influence their perception of technology's relevance. Almaiah et al. (2020) suggest students in technology-related programs might be more accepting of video conferencing due to its connection to their field, while those in non-tech programs might be less familiar or see it as less relevant.

### *Research hypotheses*

Based on the literature review of the effects of age, gender and program of study we propose the following hypotheses:

- H<sub>0</sub>1:** There is no statistically significant difference in the readiness of male and female pre-service teachers for synchronous learning through video conferencing.
- H<sub>0</sub>2:** There is no statistically significant difference in the pre-service teachers' readiness for synchronous learning through video conferencing by a program of study.
- H<sub>0</sub>3:** There is no statistically significant difference in the pre-service teachers' readiness for synchronous learning through video conferencing by age.

### *Research questions*

The following research questions guided the study:

1. Which tools did pre-service teachers mostly use for video conferencing before and during the COVID-19 lockdown era?
2. What problems do pre-service teachers mostly face with the use of video conferencing for lectures?
3. How can video presentations be integrated into post-COVID teaching and learning?

## MATERIALS AND METHODS

The research methodology utilized is an explanatory sequential mixed-methods approach (Creswell & Creswell, 2018). This mixed-methods research methodology was considered well-suited for this study because it allowed the researchers to first gather quantitative data using a questionnaire and supplemented the research with semi-structured interviews guided by an interview protocol. The structured questionnaire was made up of questions that centered on the perspectives of pre-service teachers on their preparedness for synchronous online courses, video conferencing tools and challenges related to their use. The interviews were carried out using a semi-structured interview guide to get a comprehensive picture of pre-service teachers' readiness for live video tutorials in the emergency remote teaching setting, as well as the extent to which video

conferencing lectures could be incorporated into post-COVID teaching and learning. The data gathering activities spanned a duration of 4 weeks. In the first week, the research team administered an online questionnaire to all pre-service teachers who took part in the study. Participants were sent a link to the secure online survey platform and given 1 week to complete the questionnaire. Following the questionnaire data collection, the research team purposively selected a subset of 18 pre-service teachers to take part in the semi-structured interview sessions. These interviews were conducted via video conferencing software over the subsequent 3-week period. Each interview lasted approximately 45-60 minutes. Each participant received an informed consent document detailing the study's objectives, their right to withdraw, and the measures taken to ensure the confidentiality and anonymity of their responses.

In conducting our research on pre-service teachers' experiences with online synchronous video conferencing, we utilized a multistage sampling technique to ensure both accessibility and comprehensive representation within our study. The initial stage involved purposively selecting Komenda College of Education and Kibi College of Education as our study sites. This decision was motivated by the fact that two of our four researchers are affiliated with these institutions. This affiliation provided significant advantages in terms of accessibility and resource efficiency, thereby reducing costs associated with travel and facilitating easier coordination with participants. The combined student population of the two colleges is 2,834. With 1,501 from Komenda College and 1,333 from Kibi College. Focusing on these colleges, we were able to target a sizable and diverse population of pre-service teachers, encompassing various educational backgrounds and perspectives. To ensure a representative sample, the second stage of our sampling strategy involved stratifying participants based on their course of study. The strata included Mathematics/ICT, Science/Mathematics, Social Science, Visual Arts, and Agricultural Sciences, with respective student enrolments of 890, 760, 832, 202, and 150 pre-service teachers respectively. Utilizing proportional stratified sampling, we determined specific sample sizes for each stratum: 128 from Mathematics/ICT, 75 from Science/Mathematics, 93 from Social Science, 25 from Visual Arts, and 19 from Agricultural Sciences. These sample sizes were calculated using an online sample size calculator to ensure statistical robustness and adequate representation across all disciplines.

Following the selection of participants from each stratum, we focused on gathering qualitative insights through interviews. Eighteen pre-service teachers were chosen based on their responses to a survey specifically designed to explore their experiences with online synchronous video conferencing. These interviews were crucial in providing a deeper understanding of how pre-service teachers perceive and engage with this technology-mediated educational format. To maintain anonymity when transcribing interview responses, the interviewees were assigned codes, thus "Participant A" (first interviewee) through to "Participant R" (18th interviewee). Frequency counts, percentages, means, standard deviations, independent sample t-tests, and one-way analyses of variance were used to analyze the quantitative data, while content analysis and narrative discussion were used to analyze the qualitative data. To make sure the items on the pre-service teachers' online synchronous video conferencing questionnaire design adhered to face and content validity standards, they were submitted to two subject matter experts for evaluation. Additionally, a pilot study was conducted at one college of education, with the results excluded from the primary investigation. The pre-service teachers' survey on online synchronous video conferencing received response rates of 85% in the pilot phase. The results of the pilot study were assessed to evaluate the instrument's dependability. The Cronbach's alpha coefficient was employed to assess the internal reliability of the pre-service teachers' survey on online synchronous video conferencing and was found to be 0.82. This suggests that all the elements comprising the individual questionnaire items on the pre-service teachers' online synchronous video conferencing questionnaire have acceptable and good reliability (George & Mallery, 2020).

**Table 1.** Biographical data of participants

Contexts		N	%
Gender	Male	182	53.5
	Female	158	46.5
	Total	340	100.0
Program of study	Mathematics/ICT	128	37.6
	Science/Mathematics	75	22.1
	Social Science	93	27.4
	Visual Arts	25	7.4
	Agricultural Science	19	5.6
	Total	340	100.0
Age (years)	Less than 15	0	0.0
	15-19	1	0.3
	20-24	213	62.6
	25-29	119	35.0
	30-34	5	1.5
	Above 34	2	0.6
	Total	340	100.0

## RESULTS

This section will introduce the demographic data and provide an analysis of the research questions and hypotheses.

### Biographical Data of the Participants

**Table 1** shows the biographical data of the respondents across the two colleges of education.

Out of the 340 pre-service teachers who took part in the study, 182 were male, and the rest were female. This means that there were slightly more male than female participants. **Table 1** also clearly shows that Mathematics/ICT and Agricultural Science had the most and least number of participants, respectively. 213 of the 340 participants, or 62.6% of the total, were between the ages of 20 and 24. However, none of the incoming teachers were younger than 15 years old.

### Research Question 1: Which Tools Did Pre-Service Teachers Mostly Use for Video Conferencing Before and During the COVID-19 Lockdown Era?

Here, the researchers tried to find the video conferencing applications that students predominantly used before and during the COVID lockdown era. **Table 2** shows the most used apps reported by students before the COVID lockdown, while **Table 3** shows the most used apps reported by students during the lockdown period.

As shown in **Table 2**, the majority (66.8%) of the pre-service teachers said they used WhatsApp for live video interaction before the COVID-19 lockdown era. About 12.4% of respondents said they did not do video conferencing at all. Less than 1% of the preservice teachers said they used both WhatsApp and Skype for video interaction. Only 1.8% said they had access to only Zoom for doing live video conferencing before the COVID video conferencing lectures began. **Table 3** shows the software applications that pre-service teachers used for video conferencing during the COVID lock down era for eLearning.

As evident from the data in **Table 3**, the majority (247 out of 340) of the preservice teachers said they used Zoom video conferencing application for live video interaction. This represents 72.6% of respondents. This was followed by those who used Google Meet (7.4%), WhatsApp (8.2%) and finally Skype (2.6%). A comparison of **Tables 2 and 3** shows that students largely used apps like Facebook Live, WhatsApp, and SnapChat for video

**Table 2.** Video conferencing applications that pre-service teachers mostly used before the COVID-19 lockdown era

Apps preservice teachers used for live video	N	%
Facebook only	7	2.1
Facebook and Skype	1	0.3
IMO APP	1	0.3
WhatsApp	227	66.8
WhatsApp and Facebook	31	9.1
WhatsApp, Facebook and Duo	1	0.3
WhatsApp, Facebook and Skype	4	1.2
WhatsApp, Facebook, Skype and Zoom	1	0.3
WhatsApp, Facebook, Skype, Zoom and Google Duo	4	1.2
WhatsApp, Facebook and Zoom	1	0.3
WhatsApp and Skype	3	0.9
WhatsApp, Skype and Snapchat	1	0.3
WhatsApp, Skype and Zoom	1	0.3
WhatsApp and Zoom	9	2.6
Zoom only	6	1.8
Not Applicable	42	12.4
Total	340	100.0

**Table 3.** Applications that pre-service teachers mostly used for video conferencing during the COVID-19 era for academic work

Apps pre-service teachers used for live video lectures	N	%
Google hangout	5	1.5
Skype	9	2.6
Google Duo	5	1.5
Zoom	247	72.6
Google Meet	25	7.4
WhatsApp	28	8.2
Webex	2	0.6
Join.me	5	1.5
Go To Meeting	2	0.6
Microsoft Teams	7	2.1
Slack	5	1.5
Total	340	100.0

conferencing before the COVID lockdown era. This was mainly for non-academic purposes. This, however, changed when they were introduced to “more formalized” video conferencing applications like Zoom and Google Meet during the remote emergency teaching in CoEs occasioned by COVID-19. Students’ use of Zoom and Google Meet were mostly because they were the choice application of teachers. Students would have no option but to use them when teachers share the link for that particular platform when they invite them for live video lectures.

## Research Question 2: What Problems do Pre-Service Teachers Mostly Face with the Use of Video Conferencing for Lectures?

**Table 4** shows the main problems faced by pre-service teachers while they participate in video conferencing. It can be observed that more than 62% of preservice teachers who participated in the study said they did not have sufficient internet data bundles to fully partake in video lectures. This means that more than half of the preservice teachers in one way or the other, struggled to get data bundles for the purpose of live video lectures. Video streaming, which is one of the main drivers of mobile data traffic growth, requires high bandwidth and low latency to provide a good quality of experience (QoE) for the user (Chiang & Zhang, 2016). Streaming videos

**Table 4.** Problems pre-service teachers mostly face with the use of live video for lectures

Problems faced by preservice teachers when doing video conferencing	N	%
Internet data bundles are expensive	213	62.6
I do not know how to do online video conferencing	37	10.9
My phone does not support video conferencing	12	3.5
I have limited/weak internet reception in my home	34	10.0
I am not as motivated as in a face-to-face classroom	21	6.2
I live in a remote area where there is virtually no network	23	6.8
Total	340	100.0

thus requires much more internet data as compared to other modes of online presentation. Given the high cost of internet data bundles in low to middle income countries including Ghana, Ghanaweb (2019), most students are not likely to find enough data bundles to fully participate in video conferencing lectures. A little more than a tenth of the preservice teachers (10.9%) said they do not know how to do the video conferencing very well while about 10% of the preservice teachers said they experienced limited network in the course of doing the live video calls. Some respondents (6.2%) were of the view that video conferencing lacked the feeling of a real classroom; they were thus less motivated to participate in the online lectures.

### Research Question 3: How Can Video Presentations Be Integrated into Post-COVID Teaching and Learning?

Interviews were used to address this research question. Eighteen (18) participants were interviewed on what they think should be done to ensure that video conferencing is integrated into the CoE curriculum in post-COVID-19 era. Interview questions mainly centered around how the provision of technical support, basic ICTs and internet bundles, improvement of telecommunications network and academic online communities would ensure the integration of video conferencing into teaching in the various colleges. The provision of technical support featured less in students' responses as fewer students believed that they needed some kind of technical support for effective video conference tuition. Majority of them felt they can engage in video conferencing without much technical support from the ICT department and assistance from their colleagues. For a few participants however, they needed to be supported in one form or the other. Participant B for example said *"I am not conversant with video conference calls and video conferencing technologies"*, while Participant H said *"I do not know how to access online video calls"*. The rest of the participants felt that technical support was not an issue for them as they were somehow conversant with video conferencing technologies. Majority of respondents however agreed that periodic refresher training on recognized platforms like Zoom and Google Meet, will greatly contribute to ensuring that video conferencing is integrated into the CoEs curriculum. Adarkwah (2021) believes that workshop and training in ICT for eLearning are essential for users to have flexibility in online delivery. Raspopovic et al. (2017) also believe that the training of digital users is essential to guarantee a successful transition and integration of eLearning platform into school curriculum.

Next, respondents were asked whether they needed some ICT tools as well as internet data bundles to enable them participate effectively in online learning. This seem to be the biggest barrier to successful video conferencing as all interviewees complained of insufficient data bundles for live video lectures. Participant A said *"I think it may be very difficult for us to continue having video lectures due to the lack of money to buy data bundles. We wish the allowance comes in full without deduction of feeding fee so we can buy data bundles to join Zoom lectures"*. Participant F was of the view that not only students, but lecturers should also be supported. He noted *"I will recommend that with the introduction of this online video lectures, an amount of data bundle is given to every student and lecturer involved"*. Participant J simply said, *I recommend that internet bundles must be given to students for these studies*. Another way of supporting students, some respondents said was to whitelist the video conferencing sites for colleges and universities. Participant E for example said *"I recommend to MoE, NAB, telcos etc. to make arrangements with the Network providers (MTN, AirtelTigo,*



Vodafone etc.) to provide free data for the sites that CoE students use for eLearning.” Participant Q also believed that “Telcos don’t have to take away students’ bundle if only they use them for live video lectures, as a way of supporting them”. This finding on the high cost of data bundle is consistent with Mukeredzi (2020), who reported that Zimbabwean students opted against online learning because of the exorbitant cost of data. This is also in line with a publication by Ghanaweb that accessing the internet is expensive in Ghana (Ghanaweb, 2019). Finally, Kwame (2021) reports that the number of people who can afford to purchase data in Ghana is comparatively low, and this puts the majority of the citizens off the internet.

The next question centered on what students think can be done about communication networks in support of video conferencing lectures. Most respondents believed that for effective video conferencing, the communications networks in Ghana, should be given a facelift especially in remote areas. Participant E said, “I suggest that the various authorities should try in their power to look at the general challenges and problems such as poor network in the rural areas by also considering how life is for others in the rural areas and how the online video learning is going to be for them”. Participant K gave some suggestions to mitigate the effect of the weak network in some areas. He noted that “Lecturers should make video recordings while teaching so after the session then they send it to us since many people cannot be available at the specified time due to network issues especially those at the villages”. This finding is consistent with Kwapong (2022) who noted that adult applicants to the University of Ghana seeking to complete an access/foundation course experienced poor internet connectivity.

Network connectivity is a major challenge in Ghana and this affects not only education but other public and private organizations. Ghanaweb (2022) notes that internet connectivity is a major challenge in some parts of Ghana which is affecting many businesses both in private and public organizations. Participants were finally asked whether they believe that strengthening of online communities will help the course of video conferencing for academic work in any way. Respondents generally believe that even though the usual online academic groups might not be used for video conferencing, it will be a great starting point to integrate eLearning and, by extension, video conferencing into the CoE curriculum. Participant C noted, “I think all teachers should have WhatsApp or Telegram groups solely for the semester courses they teach, the continuous online engagements will make us conversant with the use of eLearning technologies including video conferencing”. Participant M also believe that “online academic communities help us to have more interaction with our teachers and so they should be encouraged in all colleges of education. Teachers can once a while introduce video conferencing there for students to be conversant with it”.

It can be concluded from the interviews that the provision of data bundles remained the biggest challenge to students to engage in video conferencing. The next biggest barrier was the weak internet connection that most students were confronted with as they tried to engage in video conferencing. Provision of technical support for students while they engage in video conferencing, even though necessary, featured less in students’ responses. Most students who participated in the interview believe that formalizing online academic communities in every semester course will encourage the use of eLearning technologies including video conferencing.

## H<sub>0</sub>1: Examining Gender Differences in Pre-Service Teachers’ Readiness for Online Synchronous Learning Through Video Conferencing

**Table 5** shows the mean difference in the preservice teachers’ readiness for online synchronous learning based on gender.

The analysis of the results in **Table 5** indicates no statistically significant difference between male preservice teachers’ readiness for online synchronous video conferencing ( $M = 3.80$ ,  $SD = 1.50$ ) and their female counterparts ( $M = 4.0$ ,  $SD = 1.40$ ). The statistical values provided [ $t(338) = 0.188$  and  $p = 0.20$ ], suggest that the

**Table 5.** Mean difference in male and female pre-service teachers' readiness for online lectures

		Levene's test for equality variances		t-test for equality of means			95% confidence interval of the difference	
		F	Sig.	T	df	Sig. (2-tailed)	Lower	Upper
Gender	Equal variances assumed	2.176	0.141	-1.321	338	0.20	-0.5156	0.1014

**Table 6.** Mean difference in pre-service teachers' readiness for online synchronous learning by program of study

Program	Sum of squares	df	Mean square	F	Sig.
Between groups	14.475	4	3.619	1.751	0.10
Within groups	692.336	335	2.067		
Total	706.812	339			

**Table 7.** Mean difference in pre-service teachers' readiness for online synchronous learning by age

Age (years)	Sum of squares	df	Mean Square	F	Sig.
Between groups	6.444	4	1.611	0.771	0.60
Within groups	700.368	335	2.091		
Total	706.812	339			

observed difference in readiness for online synchronous video conferencing is insufficient to determine that there is a notable distinction between the two groups. Therefore, the data suggests that both male and female pre-service teachers were prepared for online synchronous video conferencing at the time of this study. In other words, there isn't sufficient evidence to draw the conclusion that male and female preservice teachers are significantly different in terms of their preparation for online synchronous video conferencing.

## H<sub>0</sub>2: Comparing Pre-Service Teachers' Readiness for Online Synchronous Learning Through Video Conferencing by Program of Study

**Table 6** shows the mean difference in the preservice teachers' readiness for online synchronous learning based on the program of study.

With  $F(4, 335) = 1.751$ ,  $p = 0.10$ ,  $p > 0.05$  (two-tailed), the results in **Table 6** demonstrate that there is no statistically significant difference in preservice teachers' readiness for online synchronous learning through video conference between the different programs of study (i.e., Mathematics/ICT, Science/Mathematics, Social Science, Visual Arts, and Agricultural Sciences). We are unable to reject the null hypothesis since the p-value (0.10) is higher than the significance level (0.05). In other words, the various programs of study (Mathematics/ICT, Science/Mathematics, Social Science, Visual Arts, and Agricultural Sciences) did not significantly differ in terms of preservice teachers' preparation for online synchronous learning using video conferencing.

## H<sub>0</sub>3: There is no Statistically Significant Difference in Preservice Teachers' Readiness for Online Synchronous Learning through Video Conference by Age

**Table 7** shows the mean difference in the preservice teachers' readiness for online synchronous learning based on their ages.

With  $F(4, 335) = 0.771$ ,  $p = 0.60$ , and  $p > 0.05$  (two-tailed), **Table 7**'s findings indicate no statistically significant difference in preservice teachers' readiness for online synchronous learning through video conference between the different age groups (i.e., 15-19, 20-24, 25-29, 30-34, and above 34) years. We are unable to reject the null hypothesis because the supplied p-value ( $p = 0.60$ ) is higher than 0.05, indicating that there is no statistically significant difference in preservice teachers' preparation for synchronous online learning through video conference among the various age groups.

## DISCUSSION

The central objective of this research was to explore the perceptions and experiences of pre-service teachers with online synchronous learning through video conferencing. The results show that Zoom was the predominant platform utilized by pre-service teachers for live video conferencing during online instruction. However, a key challenge faced by students was the lack of adequate internet data and connectivity, which hindered their ability to effectively engage in online video conferencing. Furthermore, the study found no significant differences in student readiness for synchronous video-based online lectures based on factors such as gender, age, or academic program. The finding that Zoom was the predominant platform used by pre-service teachers for live video conferencing during online instruction aligns with the growing body of research on the improved adoption of video conferencing tools in education during the COVID-19 pandemic (Adedoyin & Soykan, 2020; Dhawan, 2020; Hodges et al., 2020).

Prior to the COVID-19 pandemic, it was generally accepted that video conferencing technology could be effectively leveraged to foster productive collaboration and dialogue in online learning environments (Bleakley, et al., 2021). However, the sudden shift to remote and virtual instruction necessitated by the health crisis appears to have significantly accelerated the widespread use of platforms like Zoom for synchronous online teaching and learning (Hodges et al., 2020). Researchers have noted that the ease of use, accessibility, and robust video/audio capabilities of Zoom made it a popular choice for educators seeking to recreate elements of in-person instruction virtually (Dhawan, 2020; Hodges et al., 2020). This aligns with the current finding regarding pre-service teachers' predominant use of Zoom for live video conferencing. At the same time, studies have also highlighted challenges associated with over-reliance on video conferencing, such as technical issues, reduced engagement, and accessibility barriers for some students (Aristovnik et al., 2020; Hodges et al., 2020). The current finding regarding the lack of adequate internet connectivity as a major difficulty faced by pre-service teachers is consistent with these broader concerns about the equity and feasibility of video-based online learning. The finding that a key challenge faced by students was the lack of adequate internet data and connectivity, which hindered their ability to effectively engage in online video conferencing, is consistent with the growing body of research on the equity and accessibility issues surrounding remote and online learning during the COVID-19 pandemic (Adedoyin & Soykan, 2020; Aristovnik et al., 2020; Bączek et al., 2021). Prior to the pandemic, studies had highlighted the potential of video conferencing to enhance student engagement and interactivity in online learning environments. However, the sudden and widespread shift to remote instruction revealed significant disparities in students' access to reliable high-speed internet and adequate data plans, which became a major obstacle to their participation in synchronous online classes (Adedoyin & Soykan, 2020; Bączek et al., 2021).

Researchers have noted that the lack of reliable internet connectivity disproportionately affected students from disadvantaged socioeconomic backgrounds, rural areas, and developing countries, further exacerbating existing digital divides (Aristovnik et al., 2020; Bączek et al., 2021). This aligns with the current finding regarding the challenge of inadequate internet data and connectivity faced by students when engaging in online video conferencing. Additionally, studies have suggested that the increased demand for video-intensive online learning during the pandemic, combined with limited internet infrastructure and bandwidth in certain regions, contributed to technical issues, such as poor video quality, audio disruptions, and connection instability,

which hindered students' ability to participate effectively in synchronous sessions (Dhawan, 2020; Hodges et al., 2020).

The current finding underscores the critical need to address the digital divide and guarantee fair access to reliable high-speed internet and technological resources to support the successful deployment of virtual and distance education, particularly during periods of emergency (Adedoyin & Soykan, 2020; Bączek et al., 2021). Strategies to improve internet connectivity and data affordability, as well as the provision of technological support and resources for students, will be crucial in enhancing the effectiveness and inclusivity of video-based online learning. The finding that there were no significant differences in student readiness for synchronous video-based online lectures based on factors such as gender, age, or academic program is an interesting observation that warrants further examination in light of previous research on this topic. Several studies have explored the role of demographic and academic factors in shaping students' experiences and readiness for online learning. For example, some research has suggested that female students may be more comfortable and engaged with synchronous video conferencing than their male counterparts (Horzum, 2015; Tsai et al., 2020). Similarly, studies have found that younger students or those with more prior experience with technology tend to adapt more readily to virtual learning environments (Adedoyin & Soykan, 2020; Horzum, 2015). However, the current finding appears to challenge these previously established trends, indicating that in the context of synchronous video-based online lectures, student readiness was not significantly influenced by gender, age, or academic program. This aligns with the work of researchers like Rapanta et al. (2020), who found that while demographic factors may play a role in online learning preferences, they do not necessarily determine a student's overall readiness or ability to engage effectively in synchronous virtual instruction.

One potential explanation for this observation could be the widespread and rapid shift to remote learning necessitated by the COVID-19 pandemic. The sudden and universal adoption of video conferencing for educational purposes may have helped to mitigate traditional barriers and equalize the playing field for students from diverse backgrounds (Dhawan, 2020; Hodges et al., 2020). Additionally, the increasing familiarity and comfort with video-based communication tools across all age groups and academic disciplines may have contributed to the observed lack of significant differences in readiness. Further research will be needed to explore the details of this finding and examine whether it holds true in other educational contexts or as the pandemic-driven online learning landscape continues to evolve. Nonetheless, the current study provides an important counterpoint to previous research and highlights the need for a more elaborate understanding of the factors influencing student readiness for synchronous video-based online instruction.

## CONCLUSION

The objective of this research was to investigate the perspectives of pre-service teachers, experiences, and challenges with online synchronous learning facilitated through video conferencing platforms. The outcome of this study showed that most pre-service teachers were ready to adopt more formal applications, including video conferencing apps, for academic work. However, problems such as expensive data bundles, weak or inaccessible networks in certain parts of the country, and a lack of digital devices that can support video conferencing are a few of the setbacks that make it difficult for students to embrace its full integration into academic work in CoEs fully. The results of this research offer valuable understanding into pre-service teachers' perspectives and experiences with online synchronous learning facilitated through video conferencing platforms. This study adds to the expanding collection of scholarly work on the uptake and integration of educational technology in teacher education programs, particularly in the context of developing countries. One key contribution of this work is the exploration of pre-service teachers' readiness to utilize more formal video conferencing applications for academic work. This aligns with and builds upon previous research highlighting the increasing familiarity and comfort of students, including pre-service teachers, with technology-mediated learning. However, the study also identifies significant barriers and challenges faced by pre-service

teachers in fully embracing the integration of video conferencing into their academic activities, such as limited access to reliable internet, high data costs, and a lack of appropriate digital devices. The findings also point to the need to strengthen some facilitating conditions, such as periodic workshop training, that could ensure a more sustainable integration of video conferencing lectures into post-COVID-19 teaching in CoEs. Regarding gender, program of study, or age, the study found no statistically significant differences in pre-service teachers' preparation for online synchronous video conferencing. Thus, CoE tutors should encourage mixed-age and gender group participation in online lectures in a bid to encourage increased teamwork, varied viewpoints, and peer-to-peer learning in online learning environments. Strengthening online communities where teachers are encouraged to have some hours of online lectures and assessment through video conferencing and institutional support, including the provision of reasonably priced data bundles and digital devices to bridge the digital divide among students will go a long way to allow CoEs reap maximum benefits in the integration of video conferencing lectures into their curriculums.

## RECOMMENDATIONS

### Recommendations for Policy and Practice

It is recommended that education policymakers put in place measures to inculcate online learning in the curriculum and not adopt a fire-fighting approach to another emergency, as in the case of COVID-19. To this end, we make the following recommendations:

1. Online academic communities must be encouraged for every semester course in CoEs. Online academic communities are internet-based groups where a cohort of learners who share academic goals work collaboratively online with one or more of their professors. They have several benefits, including extending teachers' contact hours with learners. The existence of such platforms will improve the capacity of teachers and learners to use video conferencing and eLearning technologies as a whole.
2. The provision of affordable data bundles, digital devices, and technical support for faculty and students to facilitate video conferencing should be prioritized. Additionally, periodic workshop training on video conferencing technologies with the aim of building teachers' capacity in video conferencing should be undertaken.
3. Furthermore, to help faculty and students become conversant with eLearning and video conferencing technologies, the management of CoEs should institute some hours of virtual tuition via video conferencing and insist that every student take at least one online assessment for each semester course.
4. Since there are no gender-specific differences in preparation for online synchronous video conferencing, educational institutions should prioritize ensuring that all pre-service teachers have equal access to technology and online learning resources. This involves giving everyone an equal chance to receive training and assistance adequately using video conferencing services.

### Recommendation for Further Research

1. Further investigation should be conducted to determine the lasting effects of online communities in teacher education programs and the implementation of online communities in teacher education programs, examining how they influence the development of digital competencies among pre-service teachers over time.

2. Comparative research should be conducted across different teacher education institutions to better understand the role of institutional support and its impact on the successful integration of video conferencing and eLearning technologies.
3. Further research should be conducted to examine the effectiveness of various professional development and skill-enhancement initiatives for educators and personnel in leveraging video communication and online learning technologies.

## IMPLICATIONS

The results imply that pre-service teachers appear to display a similar level of preparation for online synchronous learning, regardless of age, gender, and particular program of study. This suggests that educators and instructional designers might provide online curricula and learning opportunities that are equal and available to all aspiring teachers, irrespective of their academic background. Policy makers will not require additional eLearning expertise and separate tools to implement online synchronous video conferencing lectures based on these demographic variables.

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