Investigating the Viability of Synchronized Online Learning for Kenyan Students in Technical and Vocational Education and Training (TVET) Institutions.

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ABSTRACT

This study looks at Kenyan TVET students' perceptions regarding synchronous online teaching. Learners were asked about their thoughts on synchronous online education in Kenya. A cross-sectional survey was carried out in four Western Kenya TVET institutions. A self-administered online questionnaire with four sections was utilized to collect data on demographic characteristics, online training details, opinions, and challenges in synchronous online learning. From the results, a total of 353 responses (a 73.2% response rate) were received from the students. It was observed that most respondents preferred smartphones (63.74%) for online access, using online learning moodles: Zoom and Google Meet (28.61% and 26.63%, respectively) as the communication platforms. A majority (71.67%) agreed that online learning is more comfortable for learning theoretically. Moreover, 44.76% of the students would choose to study physically to complete their studies because 77.05% of them agree that physical learning is more motivating than online learning. The respondents strongly agreed that the high cost of the internet (46.74%), inability to conduct practicals online (39.38%), and poor internet connections (21.25%) are the main challenges encountered during online learning.

The findings highlighted that online learning could not produce desired results in TVET institutions in Kenya because most students cannot access the internet due to technical and monetary issues. They further stated that the lack of face-to-face interaction with the trainer was less motivating since a longer response time is needed to clarify a concept. Furthermore, interruptions during lessons from internet connections, the environment, and peers make synchronous online learning more challenging.

Keywords: Synchronous Online Learning, Perception, TVET, COVID-19, Face-to-Face Learning

INTRODUCTION

COVID-19 caused widespread shifts and effects on learners, educators, and educational institutions worldwide (Chaturvedi et al., 2021; Tadesse & Muluye, 2020). For the purpose of students practicing social distancing, schools, colleges, and institutions worldwide were forced to close due to the pandemic. However, it would be unrealistic to expect a smooth transition from the current educational system to one based on online and distant learning to occur overnight (Masalimova et al., 2022; Toquero, 2020). There are currently a variety of difficulties and obstacles connected to this rapid change. Using the most current technological tools available, schools worldwide have opted to create online learning materials for students in all subject areas (Crawford et al., 2020; Yasmin, 2022). This decision has profoundly affected various learning platforms, particularly those prioritizing

distance learning via the internet (Zalat et al., 2021).

Learning via the internet has two elementary settings: asynchronous and synchronous learning. Comparisons between asynchronous and synchronous environments are common in online education. Learning and teaching occur at different times and in various locations in each of them. Asynchronous environments are not time or location-bound and are typically more student-driven and self-paced, with less reliance on instructors (Fabriz et al., 2021; Rapanta et al., 2020; Zawacki-Richter, 2021). In synchronous online learning, real-time interaction, the use of a common communication language, and instant feedback are three of its most incredible benefits (Fabriz et al., 2021). These characteristics can give an online course a more personalized feel and help to lessen the gap between online and conventional classroom learning. Students benefit more from learning practical skills in a synchronous online context, while asynchronous settings are more conducive to cognitive success, such as producing meaningful and insightful discussions (Ogbonna et al., 2019). Moreover, synchronous online learning increases students' interest in education and dedication to their work (Sweetman, 2021). However, the risk of passive involvement in class, such as passive listening and viewing the teacher's lecture or reading statements from the chatbox, are the most significant drawbacks of synchronous learning that have been observed, just as it would be experienced in a face-to-face environment (Al-Gerafi et al., 2024; Fieger & Rice, 2024; Kong et al., 2024; Prudencio et al., 2024).

Over the years, online education in the context of community colleges has continued to face obstacles. To a large extent, the success of this teaching method depends on the accessibility of the internet and the students' devices, since they have to be online and able to download materials and listen to recordings or live lectures (Almahasees et al., 2021). Due to the nature of online education, students have complained of feeling disengaged, isolated, and unable to ask questions (Ogunyemi et al., 2022; Penrod et al., 2022; Wang et al., 2022).

According to Alashwal (2020), for a long time, colleges had preferred using a face-to-face teaching model to online education, whereby the teacher was the primary source of knowledge. This led to a decrease in quality education and student support. Therefore, many community college students who enrolled in online courses were attracted to the flexible schedule that required minimum live attendance (Fieger & Rice, 2024; Kong et al., 2024). However, they were unprepared for challenges such as the lack of structures, resources, and devices, which resulted in decreased active engagement in classes that usually occur in live classes (Alzahrani, 2019; Kaushal Kumar Bhagat et al., 2016). Inadequate resources and unequal access to the internet make the rapid transition challenging for both students and trainers (Della Bestiantono et al., 2020; Rasmitadila et al., 2020). Moreover, online learning is more capital-intensive. Institutions need digital platforms, tools, and video and teleconferencing software. Some of the digital platforms and tools required include: MOOCs (massive open online courses), LMSs (learning management systems), and video conferencing programs for online learning (Kim et al., 2020). As seen, many difficulties and impediments are associated with online education that both students and trainers must overcome.

The other challenges include: not having enough assessments, decreased time for personal growth and activities, and inadequate data to evaluate the achievement of online learning and the learning gaps (Damary et al., 2017; Smith et al., 2009; Zhu et al., 2022). The reliance on technology (Patricia Aguilera-Hermida, 2020; Schophuizen et al., 2018). The network requirements (Dutta, 2022; Truzoli et al., 2021), low practicability (Schophuizen et al., 2018), inadequate online teaching experience (Patricia Aguilera-Hermida, 2020), and high hardware requirements (Truzoli et al., 2021). These are just a few of the issues that make learning online more challenging to initiate in the local communities of Kenya. Learning online does not promote student-student and student-teacher interactions, resulting in poor empathetic feelings and social relations (Alashwal, 2020; Barr, 2011; Dodd et al., 2021; Tan & Caleon, 2022; Wang et al., 2021). Pedrelli et al. (2015) pointed out that most college students are generally young; therefore, the time spent in higher education is crucial for the growth of both character and skills. Institutions of higher learning have been pivotal in formulating global strategies for sustainable development. Teaching, research, and extension are three of higher education's primary tasks that help prepare students for careers in various fields. One develops the ability to solve a wide range of scientific and social problems (Fernández-Ahumada et al., 2020), which may not be effectively inculcated in the young minds in an online learning environment. Finally, according to the available literature, some learners became more stressed

due to a lack of resources or support at home necessary for equitable access to online education (Marcén-Román et al., 2021).

On the other hand, synchronous online education has emerged to have significant benefits, like saving time and effectively completing theoretical courses or units in the curriculum faster than before. Therefore, many students worldwide can benefit significantly from higher education opportunities accessed via online learning platforms (Alqurashi, 2019; Fernández-Ahumada et al., 2020). The other benefit of synchronous online learning is that one can comment on the learning course, ask questions, and reply in real time. Because of its flexibility and accessibility around any schedule, online education is also a valuable instrument for preventing the spread of the coronavirus and other infectious diseases (Syauqi et al., 2020).

Although various studies were conducted to investigate the impact of psychological, physiological, and environmental aspects on online learning, these investigations were limited in terms of the breadth of their subjects and the depth of their analysis. Therefore, this study has identified the need to investigate TVET college students' perceptions of online learning. Given that online learning is accessible to remote places with the internet, it is, therefore, essential to conduct an empirical evaluation of the viability of online learning, the extent to which it meets curriculum goals, and the suitability and adaptability of the students to online learning, based on the learners' perspective. This study also investigated the challenges the students face in this learning environment. Data collected here will help develop and implement high-quality online TVET programs in Kenya.

METHODS

A descriptive cross-sectional study was conducted between February and April 2025 at Riragia Technical and Vocational College, Borabu Technical and Vocational College, Mawego Technical Training Institute, and Kisii National Polytechnic. An ethical clearance was obtained from each of the four institutions. This study enrolled 480 students from four faculties in these institutions. After assessing the relevant literature, Google Form survey management software was used to create a self-administered online questionnaire. There were a total of 12 questions on this survey. The purpose of the questionnaire, how responses would be kept confidential, how participation would be optional, and the option of opting out if one so desired were all explained in an introductory paragraph. Except for question 12, which utilized a Likert scale, all of the questionnaire's questions were having multiple-choices. The five-point categorical alternatives used in the questions utilized the Likert scale, allowing for quick, easy, and straightforward quantitative analysis. The Likert scale normalizes the questionnaire's alternatives into a scale ranging from "Strongly Agree" to "Strongly Disagree," allowing the researcher to gain a holistic view of respondents' attitudes or opinions. In this study, the levels of agreement were coded as follows: 5 (Strongly Agree), 4 (Agree), 3 (Neutral), 2 (Disagree), and 1 (Strongly Disagree). To get a more intuitive sense of the subject's status, it's needful to calculate a total score by weighting the percentage of subjects in a given group on each option by the Likert scale corresponding to that option as expressed in Eq. (1) (Alan & Atalay Kabasakal, 2020; Anjaria, 2022; Ryan & Garland, 1999).

$$LP = \sum_{i=1}^{5} S_i \times P_i \qquad \text{(Eq. 1)}$$

Whereby "LP" denotes the Likert point for a given item, S_i denotes the Likert scale that ranges from 1 to 5, and P_i is the percentage of the corresponding category i.

In the first section, participants were asked four questions about themselves to understand their background and interests. The second part focused on the technologies (tools, software, and devices) students use to do their online coursework. The final part discusses how the participants perceive and view online learning. The previous section aimed to identify and highlight the challenges associated with online learning.

Students from all four schools were invited to complete the survey and contacted via email. After the survey was sent, a weekly reminder was emailed to all students to guarantee the maximum response rate possible.

RESULTS

A total of 353 questionnaires completely filled were returned (29.5% from business management students, 26% from hospitality, 32.9% from health and applied sciences, and 11.6% from engineering), resulting in a 73.2% response rate, 38 incomplete questionnaires, and 89 non-respondents. As observed from Table 1 and Figure 1(a), the respondents were in the following levels of study: Artisan (19.3%), Craft (38.8%), Diploma (35.7%), and other certifications (6.2%). Pie charts representing demographic data of the respondents' courses are shown; in Figure 1 (b), 54.1% of the respondents were female. In Figure 1 (c), more than 76.4% belonged to the age group 18 to 25 years. In Figure 1(d), most respondents were from the Department of Physical and Health Sciences (33%).

Table 1: Table representing demographic data of the respondents

Factor	Option	frequency
certification	Artisan	68
	Craft	137
	Diploma	126
	Other certification courses	22
Sex	Male	162
	Female	191
Age groups	18-25 yrs.	270
	26-30 yrs.	79
	Above 31 yrs.	4
Faculty	Engineering	41
	Business management	104
	Hospitality	92
	Physical and health sciences	116

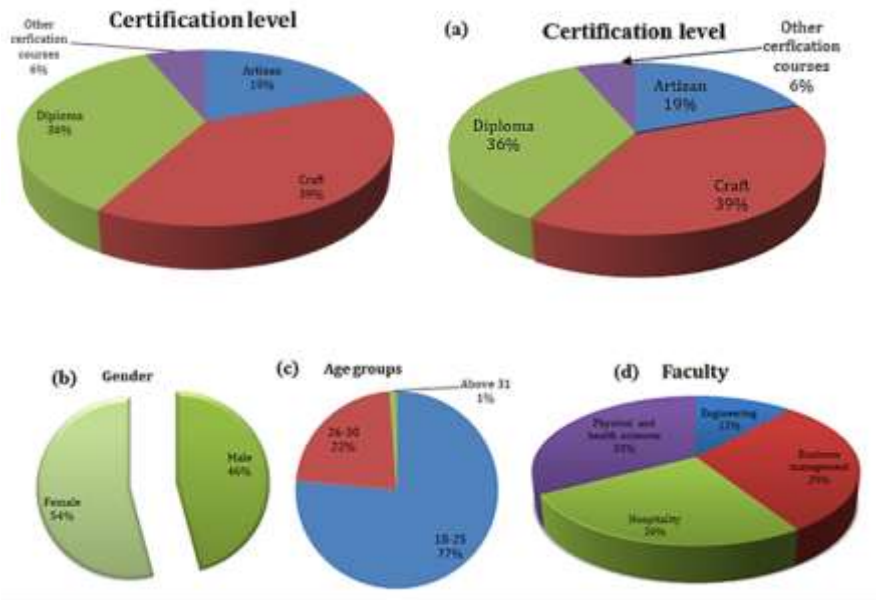

Figure 1: Pie charts representing demographic data of the respondents

Table 2 shows the online learning sessions in detail as experienced by the respondents and how the respondents feel about online education as a whole. Most individuals (77.1%) think online courses are inefficient at imparting knowledge since they are less motivating than physical learning. However, only 17.9% of the respondents said they would prefer learning online because of its many advantages over traditional classroom learning. They cited benefits such as greater flexibility and adaptability of online learning to the students' needs, the ability to save time and cost since one can multitask, and the opportunity to learn at one's own pace.

Table 2: Respondents' online learning preference

Factor	**Option**	**Frequency**	**Percentage (%)**
The device used by the Student	Laptop	43	12.2
	Smartphone	225	63.7
	Personal Computer	23	6.5
	Others	31	8.8
Online Platform	Zoom	101	28.6
	Google Meet	94	26.6
	Moodle	117	33.1
	WhatsApp	34	9.6
	Others	7	2.0
Lesson Type	Practical	59	16.7
	Theoretical	253	71.7
	Both	41	11.6
Prefered Learning Environment	School	88	24.9
	Home	155	43.9
	Office	63	17.8
	Library	14	4.0
	Others	33	9.3
Motivating than Physical Learning	No	272	77.1
	Yes	81	22.9
How students would prefer to complete their courses	Only Synchronous Online Learning	63	17.8
	Physical Learning	158	44.8
	Using Both Synchronous And Online And Physical Classes	132	37.4

Table 2 shows that most respondents (63.7%) used their smartphones to access online courses. At 33.1%, Moodle is the most popular online learning platform for communication, followed by Zoom at 28.6% and Google Classroom at 26.1%. While most students took their online courses from the comfort of their own homes (43.9%), others also undertook online learning from their colleges (24.9%) and workplaces (17.8%). Most respondents (71.7% overall) reported that learning was primarily theoretical in content. Many students (77.1%) disagreed with the assertion that online learning is more inspiring than traditional classroom learning; only 22.9% agreed with this statement. In a survey of college students' attitudes toward taking and completing entire courses online, only 17.8 percent of respondents said they would do so successfully, whereas 44.8 percent preferred to take a course through physical or traditional classroom learning.

The frequent difficulties that college students have while taking courses online are presented in Table 3. According to the respondents, the most common barriers to online education were: high internet costs (72%), bad internet connection (48%), and lack of electronic gadgets (45%). The other challenges include learners becoming less motivated when alone in their studies. They are easily distracted by more enticing alternatives such as television, movies, chatting, friends, and video games. The lack of opportunities to ask questions and engage with instructors and long, monotonous, and boring lectures are other challenges the learners encounter. Further learning practical-based courses using videotaped and synchronous lectures makes lessons even more demotivating. Over 91% of the respondents agreed that the student's motivation to learn would suffer if subjects like engineering and health sciences, which necessitate practical learning, were taught online, whether asynchronously or synchronously.

Table 3: Challenges encountered during online learning

Challenges encountered during online learning.	Frequency and percentage				
	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Lack of devices	**58** (16%)	**104** (29%)	**61** (17%)	**91** (26%)	**39** (11%)
High cost of the internet	**165** (46%)	**93** (26%)	**71** (20%)	**24** (7%)	**0** (0%)
Network and software challenges	**75** (21%)	**95** (27%)	**103** (29%)	**55** (16%)	**25** (7%)
Less understanding of concepts	**46** (13%)	**101** (29%)	**98** (28%)	**113** (32%)	**1** (0%)
Boring classes	**39** (11%)	**89** (25%)	**102** (29%)	**107** (30%)	**16** (4%)
Practical lessons cannot be learned	**139** (39%)	**183** (52%)	**29** (8%)	**0** (0%)	**2** (0%)
Interruptions during classes	**65** (18%)	**72** (20%)	**99** (28%)	**83** (24%)	**34** (10%)
Less motivating	**11** (3%)	**64** (18%)	**124** (35%)	**45** (13%)	**109** (31%)

DISCUSSION

The transition from classrooms and face-to-face study to online learning gives students an experience very different from their conventional educational experience. The majority of students in college who undertook the survey were seen to have doubts about digital and online education and, more so, synchronous online learning. Students in Kenyan colleges confront several challenges, including a lack of quality technology, slow or unreliable internet connections, and a lack of engagement and contact with peers and teachers. Furthermore, Online education presents more challenges to many students because of the absence of on-campus sociability, difficulties in working in groups, and slow response times from trainers. Schools and colleges in rural locations often do not have the facilities to provide their students with access to the internet. For that reason, few schools could roll out successful synchronous online courses during the onset of COVID-19 (Din et al., 2015; Farahat, 2012; Gomis-Porqueras & Rodrigues-Neto, 2018; Yen et al., 2018). Therefore, this research discusses the difficulties students encountered during the introduction to online learning sessions.

In this survey, Respondents also felt that classroom learning was more beneficial than synchronous online or distance learning since most students in developing nations lack the resources and infrastructure to access the internet. Therefore, it seems that online education in these regions may not be successful since students require significant computer and technological knowledge to study from online lectures and an understanding of how to keep up with the increasing pace of online learning for the program to be productive and effective for the learners (Bange et al., 2025; Csorba & Dabija, 2024).

Similarly, about seventy-one percent of students said that they found classroom learning to be more motivating than online learning. The respondents highlighted the importance of intrinsic motivation for online learning as a less-discussed aspect of online education. The face-to-face interaction between students and teachers and with other students in a conventional classroom encourages more participation in both academic and co-

curricular activities. Individualism of online learning might leave learners feeling isolated (Le et al., 2018), which may result in a significant barrier to developing society's talent cultivation nature and the long-term effectiveness of higher education institutions. Additionally, as the respondents noted, the students have much trouble completing group tasks that require in-depth collaboration since they cannot be completed without physical meetings with other group members (Celbis et al., 2025).

Institutions generally have a positive attitude toward online learning because it also offers education and training. Some trainers and trainees, in the wake of COVID-19, chose to adjust their instructional methods and learning environments to fit the demands of the virtual classroom environment (Almendingen et al., 2021; Le et al., 2018; Mishra et al., 2020; Muthuprasad et al., 2021). Even though many people believe that taking classes online is more efficient and saves them time, many students still prefer the more practical, face-to-face approach to learning in traditional classrooms. Many students reported that although online learning helps them finish tasks on time, they still find it challenging to finish entire courses in this manner. Moreover, sometimes online learning may result in prejudice against students who have limited or no access to online resources, yet all students have an equal opportunity to obtain a conventional classroom education (Russo, 2025; Silva, 2025; Sun et al., 2024).

The findings of this study reveal that mobile devices are the primary means through which students access online educational resources. These findings are consistent with the global survey among other college students from various disciplines, colleges, and institutions (Coman et al., 2020; Han, 2022). Smartphones are portable, low-cost devices helpful in disseminating knowledge in any setting, context, and environment. This may explain why there has been a rise in the number of people participating in online educational activities via mobile devices. However, they are not as well-suited for Practical lessons (Han, 2022). In addition, a smartphone's limited capabilities make it difficult to use it as a study aid, as the students are from different socioeconomic backgrounds, limiting some of them from equal access to sophisticated online classroom facilities and resources. This poses a significant concern since it can diminish the efficiency and effectiveness of online education (Okyere et al., 2024). A further drawback of smartphone use is that it leads to mind wandering, especially during class or study time. College students' minds wander from lectures to texts, incoming calls, social media platforms, and other smartphone features like games. The students' elevated levels of social media use (e.g., WhatsApp, Facebook, TikTok, or Twitter) result not only in the diversion of attention from classes but also in psychological stresses, behavioral change, and academic performance is generally affected (Gopal et al., 2021; Han, 2022; Sumuer & Kaşıkcı, 2022).

This study also found that inadequate availability of the internet was another major factor in students' inability to learn online. In addition, many students in college struggle financially. Hence, the little finances the Student gets will not be used to buy internet. Even though some network service providers can provide internet at a user-friendly price, these network providers have poor connectivity, especially in colleges far away from town centers.

Another challenge the respondents agreed about (over 91%) is that practical lessons were poorly handled during synchronous online learning. The health and engineering courses that included theoretical and hands-on training were not effectively taught, and no virtual reality (VR) or simulation techniques were used in online teaching. Students were taught only theories in anticipation that when the schools would open, the students would go to the college physically to do the practicals. As seen from this survey, finding practical and interactive digital educational content for these disciplines was quite a task since practical virtual opportunities are underutilized. Therefore, developing hands-on knowledge and practicals using digital channels is necessary. More virtual learning and teaching facilities and the development and design of simulation laboratories and games are needed to advance competency-based online learning (Chang et al., 2022; Portnoy et al., 2022; Zhu et al., 2022). The digital content should implement interactive online learning sessions that can be made available via smartphones. As a result, online education reform necessitates new teaching, learning, and grading approaches. Therefore, it is also crucial to increase teacher and student awareness of the benefits of online education and conduct training on the application and availability of technology to improve their preparedness and optimize the benefits derived from online learning (Rajan & Vati, 2022; Yen et al., 2018; Zarei & Mohammadi, 2021).

The other significant challenge associated with online learning that has been reported in the literature is health-related maladies. Mohan et al. (2021) utilized questionnaires and experiments to determine the risks associated with e-learning. The researcher found out that students' physical health was negatively impacted by online learning during the COVID-19 pandemic. The researcher reported that online learning resulted in eye strain, and the students could risk suffering from myopia. A higher risk of myopia and other eye diseases was also reported in students who watched computer screens from less than 50 cm away, according to some studies (Foreman et al., 2021; Jaschinski-Kruza, 1991; Shantakumari et al., 2014). As reported in the literature, the possible cause of myopia and other eye diseases was the disparity in the distance between the screen and the viewer's eyes (Andre et al., 2003; Rempel et al., 2007).

When the students were questioned if they would like to complete their course entirely through synchronous online learning, most students did not like doing the entire course online. Only 17.8% would prefer to learn using online means only. The rest would like to learn in a physical classroom (44.8%), and the rest would love online learning blended with physical classes due to the challenges discussed in this study. The other concerns that emerged from this survey include the potential adverse psychological effects, such as isolation, anxiety, depression, and grief (Conrad et al., 2021). When Shi et al. (2022) looked at the impact of e-learning on five dimensions of mental health: emotions, personality, relationships, learning behavior, and employment opportunities. The findings revealed that students' psychological stress caused them to perform poorly in class when they were separated from their friends.

Multiple limitations exist in this study, such as, despite the large number of TVET institutions in Kenya, this research only studied four institutions and included students from four departments. In addition, this research did not consider special-needs students who would need extra support during the shift to online instruction. Thus, the findings of this study may have limited applicability, and therefore, the generalized statements are limited. Also, the respondents may have been misled by their perceptions of the evaluation statements, which were constructed in an overly optimistic tone. However, to our knowledge, no study has examined how TVET students in Kenya feel about online education. Future studies will need to combine the efforts and coping methods of various stakeholders in the online learning process, such as teachers, students, schools, and parents, to arrive at a workable, comprehensive solution.

CONCLUSION

Taking classes synchronous online can indeed be a time-saving and productive option. While potentially attractive, this method of teaching and learning appears less fruitful in most TVET colleges in Kenya due to the many obstacles that must be overcome. The study's most significant results are related to the problems of unequal access and limited internet resources and facilities, limited opportunities for student-teacher interaction and discussions, and the inability to perform practical learning and training. All these factors contribute to the impracticability of synchronous online education. Therefore, corrective efforts must be taken to identify and address the obstacles involved in online learning to maximize its benefits to a wide range of disciplines that engage in skill-based (practical) education.

Ethical Considerations

This research emphasised social responsibility by offering balanced insights on the impacts of the viability of synchronized online learning for Kenyan students in Technical and Vocational Education and Training institutes.

It intends to provide practical recommendations that support sustainable synchronous online learning practices.

Conflict of interest statement

The authors declare no conflict of interest.

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ONLINE LEARNING QUESTIONNAIRE

Introduction

As a student in the western region technical institutions, you are welcome to complete this 5-minute questionnaire to let us know how your online learning has been conducted so far. This is to help us look into new and innovative ways to conduct our online classes. All your responses are anonymously recorded, so feel free to provide honest feedback. Your responses will help us improve our teaching and your learning environment.

Questionnaire about Online learning

Q1. Level of study

□ artisan □ craft □ diploma

Q2. Gender

□ Male □ Female

Q3. What is your major category?

□ Sciences □ engineering □ Hospitality □ Business management

Q4. Age group

□ 18-25 □ 26-30 □ Above 31

Q5. Have you had any online learning experience before doing this questionnaire?

□ More than 2 semesters □ 1 semester □ None before

Q6. Which type of lessons do you learn online?

□ Practical □ Theoritical □ Both

Q7. What device do you prefer for online learning?

□ Phone □ Laptop □ Personal computer □ Others:

Q8. Which online learning platform did you prefer?

□ Home □ School □ Office □ Library □ Others:

Q9. Is online learning more motivating? Give a reason

□ YES:

□ NO:

Q10. How would you prefer to complete your studies?

□ Only by synchronous online learning

□ Only by physical learning

□ Using both synchronous and online and physical classes

Q11. How difficult is online learning compared to physical face-to-face classes?

□ Very difficult

□ A little difficult

□ About the same degree of difficulty

□ Easy

□ Very easy

Q12. Please tick how you think the following problems or difficulties affect you during your online learning. (For each challenge, mark once)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Lack of devices	□	□	□	□	□
High cost of internet	□	□	□	□	□
Network and software challenges	□	□	□	□	□
Less understanding of concepts	□	□	□	□	□
Boring classes	□	□	□	□	□
Practicals lessons can not be learned	□	□	□	□	□
Interruptions during classes	□	□	□	□	□
Less motivating	□	□	□	□	□