Exploring Learners' Experiences in Video-conference Classrooms through the Extended Technology Acceptance Model

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Abstract
The forced switch to fully online learning during the pandemic lockdown resulted in the conversion of video-conference platforms into digital classrooms. The emergency situation at the time left no room for necessary research, training and adequate deployment process, thus forcing both learners and instructors to adopt these learning environments as the only solution to learning during those times. After the lockdown seasons were over, several educational institutions have been considering hybrid instructional modes, thereby making these platforms to persist within education. This necessitates the assessment of learners' perception on learning in these new classrooms. This study aims to inform and inspire the design of inclusive, and sensitive future learning environments and schools where the needs of all types of learners are factored into instructional design and delivery. An analysis model based on the Technology Acceptance Model (TAM) was deployed in this study which reports on findings from an online survey of 86 respondents consisting of 48 males and 38 females all educated at post-secondary levels. Respondents ages were between 17 and 60 years with a mean age of 30.49 years. Findings show positive learners' perceptions of video-conference in terms of most constructs, with more neutral and almost negative feedback regarding support for collaboration and instructor presence. No negative perceptions were reported regarding frustration with the technology, and no difference in perception was expressed regarding continuation of virtual learning on video-conference, or return to physical classroom. Platforms were rated by respondents based on factors considered by respondents as important for learning; the highest ratings were assigned based on features including screen sharing, host meeting control capabilities and guest control.

Keywords: Video-conference classroom, Zoom, Post-COVID education, technology acceptance model, TAM, communication technology.

Introduction

Communication technologies have significantly improved classroom communication, especially in higher education (Youssef & Dahmani, 2008). The pandemic outbreak of 2020 was unexpected, and came at a time when many institutions across the world were still grappling with adjustment to new media and encouraging teachers to adopt eLearning more. The pandemic took the entire world by surprise, leaving nations with no choice than to fully relocate education to online classrooms as the whole world shut down to hide from the deadly corona virus. With return to post-COVID 'normalcy', many institutions have either remained partly or fully online, and many are considering standardizing to hybrid modes.

Feedback on the benefits of online learning had been mixed. Decreased achievement in both math and language arts were reported for students who attended charter schools (Fitzpatrick et al., 2020), while other studies (Darkwa et al., 2021) reported greater effectiveness based on support for better retention and a lesser amount of time required for learning. Although these learning models are increasing the options open to learners and teachers, they are employing novel 'classroom learning environments' (CLEs).

Research Objectives

The shift to online learning during the pandemic was sudden and without planning. The situation left no room to effectively design systems necessary for transition to virtual delivery. As excellently as the video-conference platforms have supported learning during the pandemic lockdown, several challenges were also recorded. Connectivity issues, infrastructure cost, Zoom fatigue (Agarwal et al., 2021; Fauville et al., 2021a; Usta Kara & Ersoy, 2022) as well as reports of poor student performance and dropout were all noted.

By the time the lockdown was over, some parents and students were not very enthusiastic about return to the physical classroom. However, many want things to return as fast as possible to where they were in pre-COVID times. Many universities and colleges were also considering gradual, partial or full return to physical classrooms. Others were trying to settle for hybrid learning approaches. With all these options open to

learners, instructors and academic institutions, assessment of learners' perceptions on these video-conference classrooms become a priority. Such evaluation should inform post-lockdown teaching practices and learning.

Many studies have examined students' perceptions of learning on video-conference platforms. For example, Berges (2021) described several classroom engagement strategies and how the strategies can be incorporated into video conference classrooms to promote learner engagement at all grade levels. Other studies (Agarwal et al., 2021; D. Bailey, 2022; Islam et al., 2020; Lech & Johnson, 2021; Minhas et al., 2021) examined other related issues. However, the specific significance of issues that specifically inherent in learning on video-conference has not been the subject of extensive studies. Examples include the challenges of classroom control for teachers, user frustration and stress (e.g. 'zoom fatigue') or constraints on interactivity in relation to social learning or presence, among others. Evaluation of these factors have important implications for learning and instructional design and delivery. An understanding of factors that may hinder effective teaching and learning in these video-conference classrooms will enable instructors to be well-prepared through adequate instructional design planning. This study therefore focuses on evaluating the perceptions of learners regarding learning in video-conference classrooms with respect to the limitations and challenges of these platforms as CLEs.

The Technology Acceptance Model or TAM (Davis, 1989) represents one of the most commonly employed framework for accessing technology adoption and use. The deployment of video-conference platforms as replacement for traditional classrooms, however comes with unique challenges that need to be addressed. Some of these issues, captured as elements of a modified TAM are examined in this study. One of these issues is user frustrations reported as zoom fatigue (Fauville et al., 2021b; Montag et al., 2022; Nadler, 2020). The limitations of these platforms regarding support for engagement, collaboration, and learner choice or student-directed learning (CSDL) (Berges, 2021; Hilal et al., 2022; Li et al., 2022; Minhas et al., 2021) is another issue. So are perceptions of the benefits of fully-remote learning, user's platform preferences, as well as the preference factors (expectations) in relation to perceptions of use (PU) and perceptions of ease of use (PEU) of video-conference for learning.

This paper focuses on answering the broad research question: "What are student perceptions of video-conference technology as classroom learning environments (CLEs)?". This broad question is addressed through the following three (3) sub-questions:

i. How do learners perceive video-conference platforms as classroom learning environments in terms of perception of use (PU) for learning?
ii. How do learners perceive video-conference platforms as classroom learning environments in terms of perceptions of ease of use (PEU) for learning?
iii. What are learners' preferred video-conference platform for learning and what are the preference factors?

The TAM has been used in many studies including education studies. This study's main contribution and innovation include the proposal of a technology model that is more appropriate for a post-pandemic scenario, and to present part of the initial results of the study that used the model. The study also contributes to the understanding of the changing education landscape and emerging CLEs as a result of current digital transformation, how this is impacting current instructional approaches, and learners, and what their potential impacts might mean for the future classroom.

Literature Review

This section presents a review of related studies and addresses emerging educational technologies and classrooms of the future, video-conference platforms as CLEs, teaching and learning in video-conference classrooms, the TAM, external variables and their impact on the TAM, and online learning and integrated learning models.

Emerging Educational Technologies and Classrooms of the Future

Learning environments play critical roles in student satisfaction and performance (Barrett et al., 2015; Yang et al., 2013), and overall effective instruction, including motivation, interest, and attendance (Park & Choi, 2014) have been discussed extensively. Technology-enabled learning or TEL was redefined as new classrooms on video-conference platforms emerged, and Zoom, Google Meet, Microsoft Teams, Webex, etc. became the new schools.

With this change came the emerging challenge of effective, fully online instruction. New teacher skills, learner skills, parental monitoring, and other issues that were hitherto mostly optional became key concerns. While mainstream education is faced with these challenges in developed nations, developing economies were faced with additional issues including internet access, gadget affordability, power, and more. This paper presents findings on a study conducted to assess learners' experiences in these novel learning spaces as a means of informing instructional design for, and in post-COVID education.

The emergence of video-conference platforms

Video-conference platforms have been in existence for quite some time. Launched as a person-to-person communication option after dissatisfaction with voice telephony, two-way video communication emerged as far back as the 1930s (Andy Patrizio, 2021). The journey from two-person communication 'with black and white still images to multi-party transmissions with 4k resolution in real-time' is a long one that involved many players. The oldest among the most popular platforms of today is WebEx which was founded in 1995 (Wikipedia.org, 2022). Skype was first introduced in 2003 (Augustyn, 2022); GoToWebinar followed in 2006 (Livestorm, 2021), while Zoom was launched in 2011 (Zoom Video Communications, 2022). Worldwide launch of Microsoft Teams was on March 14, 2017 (Microsoft Teams, 2022) around the same time as the initial launch of Google Meet as 'an enterprise-friendly version of Hangout' in February (Perez, 2027). However, Meet only became available to the general public in 2020 during the pandemic, making it the last in line of top currently popular platforms in the public space.

With the emergence of COVID-19 at the end of 2019 and subsequent closure of schools at all levels while the world hid from the coronavirus, there was a global demand for all nations to move learning into online spaces. Hence, in the last 3 years, the world has seen the emergence of several new video-conference platforms providing solutions for in-person meetings for few as well as several hundred participants. These video-conference became global life-savers during the pandemic lockdown, and have remained persistent features in teaching and learning even after the pandemic lockdown was over. As the education community continues to debate and consider hybrid learning modes, video-conference software will continue to feature in education. With these changes, and their implication for schools and universities, especially in terms of data privacy, it might become a necessity for institutions to begin developing their own platforms.

Teaching and learning in video-conference classrooms

Apart from its support for anywhere, anytime access to learning, remote learning on video-conference platforms offers additional advantages. The recording feature supports flexible and student-cantered learning whereby learners can access learning materials and content in their own time and pace. In addition, huge amounts of travel costs were saved by teachers and students due to travel restrictions. Though there are limitations with mobile access, most of the platforms are accessible on any smart device as long as there is internet connection. These changes have also exposed educators to global audiences and an unprecedented number of lessons and learning materials are continuing to be uploaded online.

The cost of setting up an online classroom being much lower than that of a brick-and-mortar classroom, many teachers have been exploring these learning spaces, making more and more useful materials available to students worldwide. Assessing and comparing the performance of remote and in-person learners as well as the effect of proctoring on student performance is still under investigation (Cherry et al., 2021; Wuthisatian, 2020). There is also hope that in the future, more advanced technologies like deep learning (Kaddoura & Gumaei, 2022) and blockchain (Sattar et al., 2023) might provide more effective, efficient and secure frameworks for assessment in online classrooms. On the other side of things, classroom control in remote classrooms, especially with very large groups is still challenging. Moreover, students, teachers as well as school administrators still have much to learn to operate comfortably in fully online learning.

Video-conference platforms are rated by users based on several factors, including their features that support various aspects of teaching. These features determine how effective learning on these platforms. Some of the most important features include cost (free vs paid), number of participants supported by the free subscription, recording feature (including the duration permitted as well as access to cloud saving), meeting controls, security and encryption, screen sharing, chat, meeting duration, and the ability of unregistered users to join a meeting.

A theoretical framework for learning on video-conference platforms integrates several learning theories. By its very nature, it draws from the Technology Acceptance Model (Davis 1989, Bagozzi, Davis & Warshaw 1992), connectivism (Corbett & Spinello, 2020; Dunaway, 2011), heutagogy (Marie Blaschke, 2012) and social learning (Bandura, 1977) theories. These theories are briefly discussed in the following sections.

Technology Acceptance Model (TAM)

The TAM is an extension of the Theory of Reasoned Action (Ajzen & Fishbein 1980). It predicts individual adoption and use of new technologies. Several studies within education and other sectors have employed either the original TAM or its variants. Previous studies on eLearning (Anderson & Ainley, 2010; Arbaugh, 2010; Sarosa, 2022) as well as more recent ones on emerging technologies like autonomous vehicles (Dimitrakopoulos et al., 2021), and robots in healthcare (Mois & Beer, 2020) have also employed the TAM.

The original TAM (Davis 1989, Bagozzi, Davis & Warshaw 1992), consists of five variables, including perceived ease of use (PEU), perceived usefulness (PU), attitude toward use, behavioral intention to use, and actual use. The two most significant factors in the

model are captured as perceived usefulness, and perceived ease of use. They determine whether a computer system or technological tool or application will be accepted by its potential users. While PU describes the degree to which a person believes that a technology can increase their performance, efficiency or effectiveness, PEU refers to the required level of mental or physical effort a person has to make to use the technology. Figure 1 shows the original TAM.

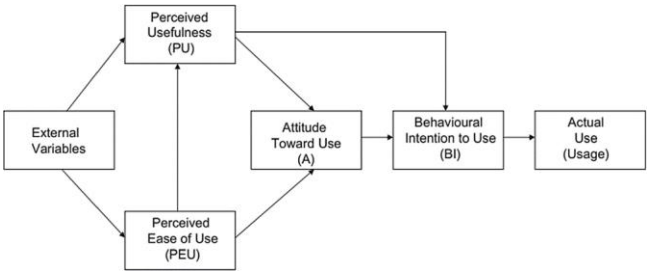

Figure 1. Original TAM (Davis, 1989)

The TAM was originally developed for the adoption of IT in the workplace, and thus neglects important factors relevant to the main constructs. The original TAM has also been criticized for its lack of subjective norms or social impact and the failure of the central constructs (PU and PEU) to provide information about how to make technology more useful and easier to use (Acceptance Lab, 2022). It has thus been extended/modified to include not just computer systems but various types of hardware and software leading to two extended versions, TAM 2 and TAM 3 (Davis, 1996; Venkatesh & Davis, 2000, Venkatesh & Bala, 2008). Figure 2 shows TAM 1, 2 and 3, their elements, and relationships.

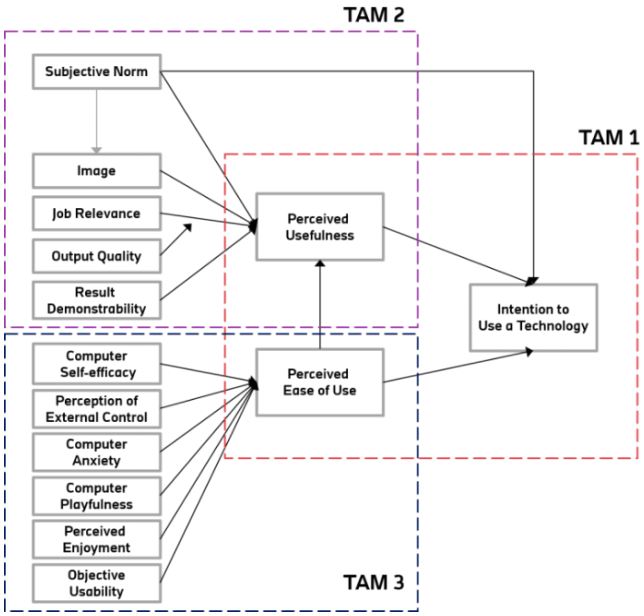

Figure 2. TAM 1, 2 and 3 (Venkatesh & Davis, 2000, Venkatesh & Bala, 2008)

External Variables and their Impact on the TAM

The interaction of external user factors with TAM had been studied extensively (e.g. Alfadda and Mahdi (2021); González-Gómez et al. 2012; Terzis and Economides 2011). Previous results on the impact of gender were contradictory (H. Al Shammari, 2021); Padilla-MeléNdez et al. 2013; Terzis and Economides, 2011). Studies on the impact of experience confirmed the moderating effect of experience over time as users gained more experience with the technology or tool (Castañeda et al., 2007); Hsu and Lu, 2004).

The peculiar nature of learning on video-conference opened up several issues with potential to impact acceptance and use by learners. While a number of important constructs like availability and acceptance has been captured in previous TAM, there are others that are specifically relevant to learning on these platforms. They include convenience and presence, frustration/fatigue, and the ability of the platforms to support collaboration, and learner choice/student-directed learning (CSDL) among others. Learners' perceptions of the benefits of remote learning, and the preference factors directly related to individual platforms or features are also important factors. They are described in the analysis model and mapped to the relevant subsets of PU and PEU.

Online learning and emerging learning models

The digital nature of the learning relates directly to connectivism which focuses on understanding learning in a digital world. Connectivism emphasizes how internet technologies (e.g. online discussion forums, and social networks) contribute to new ways of learning. With extensive changes in how, when, and where we now learn, Siemens (2017) had identified several principles of connectivism. They include i) learning and knowledge as residing within diversity of opinions, and ii) learning as the connecting of specialized nodes or information sources, which can also reside in non-human appliances. Others are that iii) the capacity to know more is more critical than what is currently known, and iv) nurturing and maintaining connections is a requirement for facilitating continual learning. Other principles include v) the ability to see connections between fields, ideas, and concepts being a core skill, while vi) accurate, up-to-date knowledge (referred to as 'currency'), becomes the intent of all connectivist learning activities. Decision-making as the last of the principles refers to vi) a learning process whereby the choice of what to learn and 'the meaning of incoming information is seen through the lens of a shifting reality'.

Siemens (2017) thus maintains that there is no constancy in right or wrong answers as today's right might be tomorrow's wrong as a result of continuous changes in the information climate influencing current decisions. Figure 3 shows the theory of connectivism.

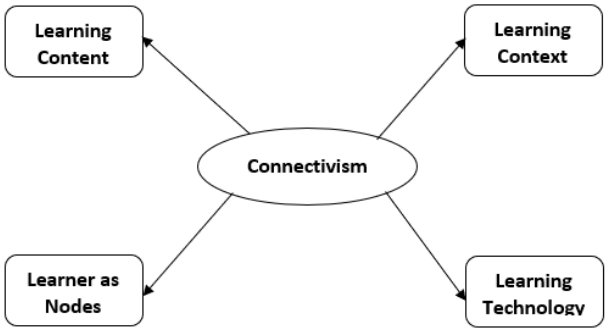

Figure 3. Connectivism

Heutagogy is a theory of self-determined learning. It is a learner-centered instructional approach that emphasizes the development of autonomy, capacity, and capability. It is one of the major frameworks upon which lifelong learning is based. Its practices and principles are rooted in andragogy. Advancement in technological development and emerging educational technologies has renewed interest in heutagogy (Marie Blaschke, 2012). It is of special interest to distance education, its attributes include 'learner autonomy and self-directedness'. In self-determined learning, learners exhibit self-efficacy, and continuously reflect on the learning process; they show communication and teamwork, creativity, and innovation as well as adaptability and flexibility in approach as well as positive values. Learning in video-conference classrooms demands self-directedness on the part of the learner and captures the many attributes of heutagogy. Figure 4 shows the features and elements of the heutagogy learning theory.

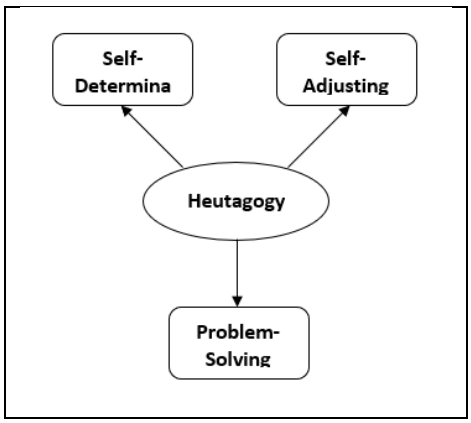

Figure 4. Heutagogy

The last of the common theories inherent in remote learning is the social learning. It proposes that new behaviors can be acquired by observing and imitating others. Bandura (Bandura, 1977) proposed that learning is more than behavior changes through conditioning (behavioral theories) or psychological influences like attention and memory (cognitive theories). He believes that people observe behavior either directly through social interactions with others or indirectly through media. However, similar to behaviorism, actions that are rewarded are more likely to be imitated, while those that are punished are avoided. The social learning theory captures several concepts related to learning as personal, behavioural, and environmental factors (see Figure 5).

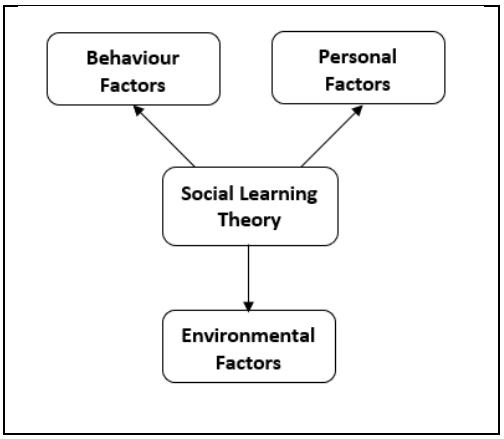

Figure 5. Social Learning Theory

Theoretical Framework

The theoretical framework of the study acknowledges the role of the TAM as a key framework for predicting individual adoption and use of new technologies. Later versions of the TAM highlight the significance of external factors. For example, Sternad and Bobek (2013) identified personal, organizational, and system/technological factors. In a similar manner, Abdullah and Ward (2016a) identified the most commonly used external factors of TAM in the context of e-learning adoption in the last ten years to include Self-Efficacy, Subjective Norm, Enjoyment, Computer Anxiety and Experience. A similar study covering publications in the last twelve years (Salloum et al., 2019) also indicated computer self-efficacy, subjective/social norm, perceived enjoyment, system quality, information quality, content quality, accessibility, and computer playfulness as the most common external factors of TAM. These factors which are directly related to the personal, behavioural and environmental factors of social learning.

The learners, learning content, context and technology aspects of connectivism links directly with the environmental factors of social learning, and the self-determination, self-adjusting and problem-solving elements of heutagogy. The behavioural requirements of heutagogy are also directly related to the behavioural factors of social learning. Hence, we highlight how the external factors of TAM align with several elements in the theories discussed as shown in Figure 6.

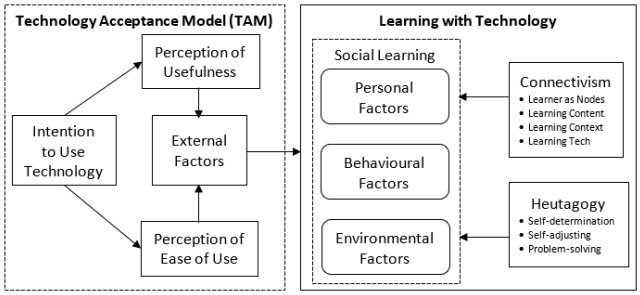

Figure 6. Theoretical Framework

Methodology

The study adopted a statistical approach involving the collection of quantitative data. This section presents the research methodology and describes the sample, analysis model, data collection procedure and data analysis. Online learning during the pandemic covered all levels of education and all subject areas including engineering and engineering education. The study participants are at post-secondary education levels and include engineering and engineering education students. Findings from the study also have application in the fields of engineering and engineering education.

Sample and Sampling

Learning on video-conference happened in all countries across the world and to learners at all stages of learning. In the first round of the study, 86 participants were surveyed. Respondents were completely randomly selected. Apart from the main themes in the study, descriptive data on age, gender, location, type of location, usage, affordability/access, level of IT knowledge, gadgets for accessing internet and video-conference classroom, as well as level of education were also collected to characterize the sample.

Analysis model: The Extended TAM Instrument

This analysis model assesses learners' experiences in emerging Classroom Learning Environment (CLEs) on video-conference platforms. It builds on the elements highlighted in the theoretical framework, and the most common external factors of TAM (Abdullah & Ward, 2016a; Salloum et al., 2019; Sternad & Bobek, 2013). The instrument consists of two sections. Section 1 captures demographic information including age, gender, location, location type and level of technological skills, as well as infrastructures for accessing remote classrooms.

The second section explores important concepts related to learning in video-conference classrooms. Apart from the issues captured in the TAM like access, especially in terms of cost and internet quality (Nunes & Ozog, 2021), a number of other issues have also received extensive focus. For example, convenience and (social) presence has been discussed in relation to social interaction as a key element of social learning (Ardiansyahmiraja et al., 2021; D. Bailey, 2022).

Frustration has also been discussed in terms of exhaustion and public/mental health (Agarwal et al., 2021; Mishra & Kumar, 2021) and fatigue (Usta Kara & Ersoy, 2022). Video-conference support for CSDL within the flipped classroom paradigm has also been explored (Guiter et al., 2021; Maphalala et al., 2021). The perceived benefits of remote learning (Cardullo et al., 2021; Lech & Johnson, 2021), and learner expectations as regards the features of video-conferencing that supports effective learning (Berges, 2021; Minhas et al., 2021) were also examined. In addition to these are an assessment of learner preference factors which influence the choice of video-conference platform (H. Al Shammari, 2021; Islam et al., 2020).

Based on the factors highlighted, the second part of the TAM instrument thus consists of 11 sub-sections containing 78 items/indicators. Table 1 shows the summary of the survey items.

Table 1. Summary of survey items & indicators

Indicators	Items	TAM Label
Availability of Technology	7	Perception of Ease of Use (PEU)
Convenience and Presence	13	
Confidence	11	
Frustration	6	
Acceptance of Technology	8	Perception of Use (PU)
Use of Technology	6	
Collaboration	5	
Choice & Student-directed Learning (CSDL)	5	
Benefits of remote learning	6	
Preference Factors	4	
User Expectation (Features)	7	
Total	78	TAM

Results

This paper reports initial quantitative results based on data collected internationally from 86 participants from 8 countries across Asia, Europe, Africa, and Australia.

Demographic Statistics

The following describes the demographic information about the study participants. A total of 86 responses were received. More than half (N=48; 55.8%) are males and 38 (44.2%) are females.

Respondents' ages range from 17 to 60 with a mean of 30.49 years (SD 11.976), a modal age of 21 years and median age of 25 years. The minimum level of education of respondents is post-high school with a higher percentage (N=70; 81.4%) having bachelor degree or higher. 67 respondents (77.9%) were based

in cities while 19 (22.1%) live in towns. 59 respondents (68.6%) identified themselves as having low-to-medium level of computing knowledge and skills (i.e. able to "handle basic tasks like emails, social media, online purchases, and working with office tools like MS Word and PowerPoint, online banking, and general computing, etc."). The remaining one-third (N=27; 31.4%) indicate they have high-to-expert computing skills (i.e. between being "very conversant with technology" and knowing "at least a programming language"). About one-quarter of respondents (N=21; 24%) access remote learning only through smartphones, while 13 (15%) access the internet only through PCs. 42 respondents (61%) are able to access remote learning through multiple gadgets. 18 respondents (21%) have access to mobile internet, 26 of the respondents (30%) have access to Wi-Fi internet and almost half (N=42; 49%) have access to both mobile and Wi-Fi internet services for accessing remote learning.

Learners' perceptions of video-conference for learning based on modified TAM

All indicators were measured on a 7-point Likert scale with a minimum score of 1 (Strongly Disagree or SD) and maximum score of 7 (Strongly Agree or SA) per item. Table 2 presents the summary of descriptive statistics for all indicators. The following sub-sections discuss the various concepts related to learners' perception of learning on video-conference.

Learners' perception of learning on video-conference:

Access

Overall mean score for Access was 38.10 (SD = 10.98), indicating respondents have a positive perception of access and consider themselves as adequately provided for in regarding infrastructure for remote instruction. A mean value >5.00 (somewhat agree) for all items indicates respondents agreed that they have access to necessary hardware, software, internet speed and stability required for remote learning. They also believe these infrastructures are affordable for their family or institution.

Use of Technology

Overall mean score of 71.09 (SD = 14.80), indicating a positive perception of respondents' ability to work with video-conference technology. Mean values for each item is mostly >5.0 (somewhat agree). Mean score for 'search for information' (Mean = 6.16, SD = 1.43) is the highest followed by using 'mobile technologies to connect to the internet' (Mean = 6.10, SD = 1.28), 'social media' (Mean = 5.97, SD = 1.31), 'office software' (Mean = 5.91, SD = 1.67), and 'different kinds of digital apps' (Mean = 5.83, SD = 1.42). Negative response to the item 'I have never used video-conference software for learning before the pandemic' (Mean 3.43) indicates that respondents were already familiar with, and have been using video-conferencing software even before the pandemic. This is further confirmed by the positive response to the item 'I have been using video-conferencing software regularly before the pandemic'.

Convenience and Presence

Descriptive statistics indicates ease of use of technology. It focuses on assessing how respondents perceive the support of video-conference software for supporting interaction, social presence, and an enjoyable learning experience within the virtual space. Table 2 reveal an overall mean score of 46.80 (SD = 12.10), indicating a perception closer to neutral (44.00) than positive. Although the mean score values for individual items are all <5.0, with many being in the 'disagree' region, it is important to note that some items in this section are negatively worded to indicate a negative perception of convenience and presence, hence, disagreement or negative response indicates positive perception. The overall sum of response thus indicate neutrality that is tending towards positive perception.

Table 2: Descriptive statistics for all indicators

N= 86	Age	Availability	Tech use	Con& Presence	Acceptance	Frustration	Collaboration	CSDL	Benefits	Preference	Features
Mean	30.49	38.10	71.09	46.80	38.30	26.14	23.95	22.31	32.29	18.77	37.06
Med	25.00	42.00	74.00	48.00	40.50	25.50	25.00	22.00	33.00	20.00	39.00
Mode	21	49.00	73.00[a]	60.00	32.00	36.00	30.00	20.00[a]	42.00	22.00	49.00
SD	11.98	10.98	14.80	12.10	10.33	10.12	8.15	6.70	7.50	5.60	9.63
Min	17	7.00	13.00	11.00	10.00	6.00	8.00	6.00	13.00	6.00	13.00
Max	60	49.00	91.00	69.00	56.00	42.00	35.00	35.00	42.00	28.00	49.00

Frustration

Responses were mostly in the 'neutral' (4.0) region for most items including finding online learning stressful (Mean = 3.51, SD = 1.97), demanding (Mean = 4.15, SD = 2.032), learning in remote classrooms being the same as in physical classroom (Mean = 3.99, SD = 2.08) or that 'instructors make more demands on students in online learning' (Mean = 3.97, SD = 1.93). However, respondents indicate preference for putting their cameras off in a video-conference call (Mean = 4.88, SD = 1.97) and they indicate that 'seeing instructor on video conference feels different from being with them in a physical classroom' (Mean = 4.99, SD = 1.78), implying a negative perception of instructor's social presence.

Self-confidence

Respondents' confidence regarding the use of various digital tools for remote learning reveal an overall mean score of 34.34 (SD = 7.96) indicating a positive perception of personal confidence in the handling of technological tools required for remote learning. Considering the fact that more of the respondents identify themselves as having low-to-medium level computing skills, this score imply that learners do not require high-level computing skills to access remote learning. Most respondents agree that they 'have the skills to operate a computer' (Mean = 6.06, SD = 1.45), are 'able to use office software for content delivery and demonstration' (Mean = 6.10, SD = 1.44) and to 'work on projects (Mean = 5.99, SD = 1.51). Respondents also agreed that 'remote learning is easy' (Mean = 5.42, SD = 1.745) and that they are 'very okay with remote learning' (Mean = 5.47, SD = 1.780).

Acceptance

Descriptive statistics for acceptance reveal an overall mean score of 38.30 (SD = 10.33) indicating an overall positive perception of acceptance. Individual mean scores for each of the item is however mostly close to the neutral region. Responses to items assessing perceptions of the ability of remote learning to promote greater effectiveness than the physical classroom, enable better learner-instructor communication or feel like the physical classroom, are all close to neutral rather than strong positive. In addition, respondents did not indicate strong desire to continue learning remotely after the pandemic. However, a similar response was provided to the item assessing the desire to return to the physical classroom. These feedbacks confirm that respondents hold generally near-neutral position regarding the choice of remote or physical classroom. There was a general indication of acceptance of remote learning as well as willingness to support remote learning in their institutions.

Collaboration

Descriptive statistics for collaboration also reveal a result similar to acceptance, with an overall mean score of 23.95 (SD = 8.15), indicating an average/neutral perception of the potential of remote learning to support collaboration for learning purposes. None of the individual items has an average value up to 5.0, indicating that the learners do not have strong positive perception of the potential or ability of remote learning to support collaboration.

Choice and Student-Directed Learning (CSDL)

Choice and student-directed learning assess how learners perceive video-conference as supportive of learner's voice and autonomy, or individual difference in learning. The descriptive statistics show an overall mean score of 22.31 (SD = 6.70), very similar to the perception of the technology for collaboration, and indicating an overall average or neutral perception. Also similar to collaboration, average values for individual are all <5.0, indicating that the learners do not have strong positive perception of the ability of remote learning to support collaboration for learning.

Perceived Benefits of Remote Learning

Respondents' perception of the benefits of remote learning through video-conference was assessed based on items including being able to 'watch lesson later' (Mean = 5.84; SD = 1.57), 'access learning materials after class' (Mean = 5.98; SD = 1.41), 'feel less anxious about performance' (Mean = 5.02; SD = 1.64), support 'flexible timing' (Mean = 5.62; SD = 1.57), every learner being able to get the instructor's attention (Mean = 4.74; SD = 1.82) and its potential to help learners comprehend learned content better (Mean = 5.09; SD = 1.57). The statistics reveal an overall positive perception with the lowest being the ability to promote individualized attention.

Preference

Preference was measured based on user's preferred platform. Respondents rated four of the most popular video-conference platforms employed during the pandemic, including Zoom, Google Meet, Microsoft Teams and GoToWebinar. Descriptive statistics for preference is shown in Table 3. The table shows greater preference for Zoom (Mean = 5.61; SD = 1.79) and least for GoToWebinar (Mean = 3.67; SD = 1.82), and implying learners prefer learning on Zoom to the other three platforms.

Table 3: Respondents Rating of Preferred Video-conference Platforms

N = 86	Mean	SD
Zoom	5.605	1.7907
Google Meet	4.953	1.7006
Microsoft Team	4.535	1.9745
GoToWebinar	3.674	1.8178

Features of video-conference platforms for learning

To further examine respondents' preferences, respondents were asked to indicate their perceptions of the important features of video-conference for learning for their preferred platform. This also provide an indication of users' expectations in terms of learning through video-conference. Table 4 presents feedback from respondents on the listed features. Participants rated all the features almost equally positively, indicating perceptions of these features as strong requirements for a video-conference platform for learning.

Table 4: Important features of video-conference for learning (Preference Factors)

	Min	Max	Mean	Std. Deviation
Screen Sharing	1.0	7.0	5.453	1.6063
Chat features	2.0	7.0	5.360	1.5256
Unlimited Recording	1.0	7.0	5.000	1.8912
User/Guest Control	2.0	7.0	5.279	1.5541
Meeting Rooms	1.0	7.0	5.244	1.6301
Host Control Capabilities	2.0	7.0	5.407	1.4823
User/Guest Control	1.0	7.0	5.314	1.5205

Screen-sharing (Mean = 5.45, SD = 1.60) and host meeting control capabilities (Mean = 5.407, SD = 1.48) are rated highest. Both can be linked directly to instructional presentation for facilitating learning, and instructor classroom control, both of which are important for management of learning in the physical classroom.

Unlimited recording was rated lowest (Mean = 5.00, SD = 1.89). This is not surprising, considering that it is not directly related to learning facilitation, instructional delivery or classroom control. Users or 'guests', as the attendees on a video-conference are popularly addressed, have little concern about recording. In many cases, they may not be aware of the demands of meeting recording as the task usually lies with the 'host'. While in many cases, learners expect access to the recording of the learning session, the surrounding technicalities (e.g. recording on gadget or cloud, or other storage and access issues) are the least of the concerns of participants or learners.

Discussion

The interaction of personal/external user factors with TAM had been the subject of many studies (e.g. Alfadda and Mahdi, 2021; González-Gómez et al. 2012; Terzis and Economides 2011). Previous studies related to learning on video-conference employing TAM (Alfadda & Mahdi, 2021; İBİLİ et al., 2022; Vu & Tran, 2022) confirm the perceived usefulness of remote tutoring systems and attitudes towards use as determinants of usage intentions. This is in line with the findings of this study. The result of this study also aligns with recent findings (Abdullah & Ward, 2016b; D. R. Bailey et al., 2022); it indicates that all variables share some relationships with one another – a common emergence within TAM literature according to Park (2009).

In their study in Korea involving a comparison of online learning using pre-recorded video lectures and live Zoom lectures, Islam, Kim and Kwon (2020) reported that students prefer pre-recorded video lectures to live Zoom lectures when each is used alone. However, a higher number of respondents (30.8%) prefer a combination of both to zoom lecture only (7.7%). Reasons given include the flexibility, convenience, and educational effectiveness of pre-recorded video lectures. They however acknowledge the importance of learners' motivation for self-learning. They noted that in the absence of clear deadlines, workload may accumulate, resulting in future challenges, especially in relation to examinations. Though the current study does not involve a comparison, the findings of Islam, Kim and Kwon (2020) throws more light on possible means of addressing effective student learning in hybrid classrooms. For example, recorded zoom lessons can become very useful learning resources after zoom lessons.

Al Shammari (2021) examined the reasons for learners' preferences for the two leading online learning platforms in Saudi Arabia – Blackboard and Zoom – during the pandemic. He found that learners preferred Zoom to Blackboard due mainly to the ease of use, and mobility (ability to access on smartphones or mobile app). Others were less technical problems and connection latency with respect to Zoom. This is also in line with the findings of the current study. However, Al-Shammari (2021) reported gender differences in preferences. Effective class management and simple interface of the Zoom application, in addition to screen sharing, and lecture recording features of zoom reported by Minhas et al. (2021) is in line with the findings of our study.

One of the key findings of the current study is the feedback indicating a neutral to negative perception of instructor's social presence. This might be one of the most important issues in video-conference CLEs. The significance of face-to-face interaction for social learning, classroom management, and instructor-student communication in traditional learning

environment has been a long-standing advantage. Its absence poses a great challenge in remote classrooms on video-conference as teachers may find themselves speaking to blank screens. Respondents in this study indicated the desire to keep their cameras off; such situations make it challenging for teachers to know whether students are present or are engaged with learning. These are among issues requiring attention.

Respondents rated the ability of video-conference lessons to support collaborative learning and social presence low. In line with this finding, Berges (2021) had reported that many teachers have struggled with incorporating engagement strategies into video-conference lessons. He however suggested that traditional classroom engagement strategies can be modified to fit the online learning modality. He described several classroom engagement strategies, especially, utilizing features of video conferencing platforms, for example, breakout rooms, chat feature, emojis, and whiteboards.

Conclusion and Suggestions for Future Studies

The study's findings confirm learners' positive perceptions regarding both PU and PEU of video-conference for learning. The statistics show generally positive perceptions of most constructs and generally neutral perceptions of others. There are no strong negative perceptions indicated regarding any of the constructs. Future correlation studies are necessary to assess the interaction of the various constructs. Though internet connectivity continues to improve, some emerging technological systems require very high broadband for proper functioning and users do experience disconnections or video and/or audio lags during lessons.

Affordability of setup and operation costs for the required technologies may also be challenging for learners and schools in poor communities. Although this study captured respondents from towns and cities, future studies focused on survey of very poor communities may shed more light on possible relevant relationships. Privacy concerns, ethical issues, users' rights (Steve Melendez, 2017) are also important subjects for future studies. Issues of 'zoom fatigue' is already in learning discourses and education studies (Fauville et al., 2021a), and other emerging issues may become critical in the future. Emerging technologies have always played significant roles in changing classroom practices, and education make changes to accommodate such developments. However, current changes have been adjudged most drastic. More studies reporting impact on social, health and physical well-being of teachers and students will help in addressing future issues.

The significance of training for instructional facilitators cannot be over-emphasized. The emergency surrounding the switch to online classrooms left no room for supporting teachers with necessary training. Many instructors were forced to adopt a learn-as-you-go approach which left gaps in knowledge that many instructors are still struggling with. Helping teachers with focused training and incorporating these changes into teacher education can become very important for promoting strategies for increasing learner engagement for students at all grade levels. These strategies will also assist in promoting instructor self-efficacy as a means of promoting more effective instruction.

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