





## Article

# Digital Transformation in Omani Higher Education: Assessing Student Adoption of Video Communication during the COVID-19 Pandemic

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**Abstract:** The COVID-19 pandemic has influenced many fields, such as communication, commerce, and education, and pushed business entities to adopt innovative technologies to continue their business operations. Students need to do the same, so it is essential to understand their acceptance of these technologies to make them more usable for students. This paper employs the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) to identify the factors that influenced students' acceptance and use of different online communication services as the primary tool for learning during the COVID-19 pandemic. Six factors of UTAUT2 were used to measure the acceptance and use of video communication services at the Business College of the University of Technology and Applied Sciences. Two hundred students completed our online survey. The results demonstrated that social influence, facilitating conditions, hedonic motivation, and habit affect behavioral intention positively, while performance expectancy and effort expectancy have no effect on behavioral intention.

**Keywords:** university student; online learning; video communications services; video conferencing tool; UTAUT2; structural equation modeling; COVID-19



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## 1. Introduction

Following COVID-19, almost all educational institutions worldwide were required to adhere to the regulations set forth by their regulatory bodies for preventing the disease's spread. They had to adjust to the emergency situation, which had an impact on the provision of conventional educational services in a number of contexts [1]. Educational institutions in Oman were directed by the regulatory authority to operate remotely by utilizing synchronous and asynchronous learning technologies during lockdown or partial lockdown scenarios. The educational sector implemented the online mode using what was available to it and to the students at home, based on the existing infrastructure, with all its variations from one institution to another.

Although many people felt unprepared during this transitioning phase, there was no other option but to use online learning. Students had to adjust while attempting to create meaning amidst the many problems associated with the pandemic. Although learning was carried out online, it was believed that the learning outcomes would still be good. There is some proof that online education can increase student achievement [2], but the reality does not match expectations because not all students embrace the use of online learning.

Most colleges and universities still experience issues with virtual learning now [3]. As the crisis persisted, educational institutions realized that they needed to invest in staff training, software development, an online educational strategy, and technological infrastructure. Institutions made significant investments in ICT infrastructure and training staff and students, and transferred a variety of functions, such as teaching and evaluation, online. However, this relocation raised questions for staff and students. Relocation in education brings the involvement of physical to digital platforming, in-person to online learning, the shift of administrative tasks to a digital system, and most importantly, the relocation of technology resource investments. Several studies have looked at the difficulties that pupils faced throughout the pandemic [4], and they all indicated the need for additional research into students' reactions to online learning and their worries [5].

Students face many challenges when learning online, such as extra homework that makes them feel stressed. This occurs because the lecturers or teachers assign them two or three tasks for each lesson. Additionally, the online attendance of students living in rural areas is impacted by network connection issues. Students' motivation to complete their homework is also influenced negatively by online learning. Since most of these challenges are faced globally, especially in developing countries, as a result, the aims of online learning are not always successfully attained. Compared to face-to-face studying, performance in learning is worse. Some students drop out and do not finish their courses, which paints a negative picture of pupils' attitudes toward learning [6].

The main transition during the pandemic was from traditional teaching approaches to remote course delivery using video communication [7], although this transition was not easy, and resulted in several challenges to faculties, instructors, and students [8]. However, teachers and learners soon became familiar with video communication and other conferencing tools through their frequent use and by exchanging digital material, including PowerPoint presentations, video links, and links to online notes [9]. Students' opinions of online studios were highlighted by [10]. Students believe that employing digital tools, opportunities for self-realization, and working well in the remote learning process are the key advantages of online studios. According to [11], the shift to online education involves several curriculum-related issues, and teachers must try to comprehend the challenges students are experiencing as a result of the new learning environment. A study by [12] reported that Zoom video chat software has the biggest potential to make classes better and address student problems. While it is one of the most popular tools for online learning that has been used to replace traditional face-to-face classes [12], using technology as a learning tool or media cannot replace students and teachers engaging face-to-face [13].

This study investigates how Omani teachers and students used video communication as a learning tool during the pandemic and whether they accepted it or not. This is achieved by utilizing elements from the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) [14]. One aspect of video communication is that it is particularly good at piquing interest, and it has a significant impact on the teaching and learning process [15]. The issue of social distancing is also overcome with these digital tools. The efficiency of video communication was demonstrated during the COVID-19 outbreak since these techniques provided a temporary fix for the issues that arose with online teaching [16–19].

Students are crucial members of any nation's citizenry and stand to gain from institutional and governmental policies, programs, and initiatives. Therefore, this study must consider the problems from the viewpoint of the pupils. Understanding problems from their point of view will enable policymakers to incorporate their views into the creation of any future policies. Despite the benefits that technological integration has always been said to bring, the current situation provides an excellent chance to examine both its benefits and drawbacks. This study will analyze the experiences that everyone has in common. The peculiarities and distinctiveness of each setting serve as the foundation for success or failure that ideally results in a plan for digitalizing education with an emphasis on the student experience.

One of the most important areas where video conferencing has taken center stage is education. Due to the COVID-19 pandemic, students who are far away from their professors now use video conferencing tools to follow classes or contact their professors. Online communication systems now give students a faster option for accessing course presentations, slideshows, admissible records, and supplementary readings from any place. This is particularly effective among those students who have problems with regular school sessions due to such issues as distance from school, health problems, or any other difficulties. As for teamwork, this can take place through multiple courses. Video conferencing devices are key tools which students can use to participate positively in exploring new ideas, disseminating information, and coordinating projects. Very often, students have to rely on educators or something else, such as the counseling department or student counselling. Students are provided with immediate help that is delivered virtually through office hours and support services which are run using video conferences. The aspect of online communication solutions having a high level of flexibility and convenience is evidenced by the fact that they were designed considering busy schedules. This means that students with hectic schedules can be easily accommodated. Students can be given course materials in different ways and also allow them to have discussions so that students who want to learn will do so in a way that probably fits them [20].

The University of Technology and Applied Sciences (UTAS) faces various challenges in its extensive use of video conferencing and Internet communication systems. A few students in the neighborhood lack regular, timely Internet access or sufficient computer equipment to be able to join their online classes. Specific students can be hesitant to dive into unfamiliar e-conferencing software applications and most Internet communication networks, and therefore, they can struggle to participate in distance learning. The prevalence of cultural norms and expectations may push students to opt for virtual classes or online group discussions. These Internet users are often quite apprehensive about the viability and security of their information when they are sharing details or taking part in private conversations [21].

Nevertheless, with these disputes resolved, more efforts may be made to ensure that all learners have enough capability to use these video conferencing and Internet communication tools. To begin with, focusing budgets towards upgrading the university's digital infrastructure, including providing good Internet connection and compatibility with different devices, is first required. Training students on video mediums and communicating on the Internet should be a part of the training curriculum to lead students to develop expertise in these technologies. Hence, our website shall also provide technical support options to students, in case they experience certain difficulties. Cultural inclusivity training for the faculty and students must be organized so that the needs of all diverse participants are considered, and creative online conversations and interactive virtual classes can take place where everyone is actively involved. Data security policies should be strong enough to allow students to enjoy their private lives in the online world, and we should use encrypted communication and more closely adhere to the rules of networking safety. Additionally, in this paragraph, we emphasize the mechanisms of feedback seeking that enable the student body to be involved in the process of designing video conferencing and online networks of communication. We explore these opportunities to recognize where and how to improve and revise strategic plans and workflows [20].

Therefore, this research's objective is to identify students' perceptions of online learning's effectiveness. The researchers wanted to gain a deep and detailed understanding of students' online learning experiences, based on the support they received during the learning process and their satisfaction with the learning facilities used. The findings of our research and both its strengths and weaknesses will be valuable inputs for institutions to improve their quality of learning based on video communication. Against this background, this study reveals the factors that affected the research participants' intentions to continue using video communication tools to participate and engage in virtual lectures in the Sultanate of Oman. This study aims to answer the following research question: What are the

factors that hindered or facilitated the acceptance and usage behavior of video conferencing tools during the pandemic?

This study also aims to achieve the following:

- (1) To examine how students felt about online coursework during COVID-19.
- (2) To determine how aware teachers are of video technologies and how they are used in teaching.
- (3) To examine the method(s) teachers are likely to use to produce educational materials or obtain an immersive learning environment.
- (4) To examine the fundamental issues that teachers believe could prevent them from implementing new technology in an online classroom.

The rest of the manuscript is structured as follows. In the following section, the constructs of UTAUT2 are explained and twenty-five hypotheses are proposed. In Section 3, the chosen methodology is described. Section 4 discusses the results analyzed with the proposed model. Sections 5 and 6 present the discussion and conclusion, respectively.

## 2. Literature Review

### 2.1. The COVID-19 Pandemic and the Education Sector

The outbreak of SARS-CoV-2/coronavirus (COVID-19 in short) and its rapid spread around the world led the World Health Organization and countries to declare the situation a pandemic in early 2020 [22,23]. To limit the spread of COVID-19, full or semi-lockdowns and social distancing were put into place to restrict its effects [24–26]. The health hazards that the COVID-19 pandemic exposed, along with the restrictions countries enforced (e.g., social distancing and lockdowns), caused the world to severely suffer on social, educational, political, and economic levels [23–25].

Students, instructors, and the educational system as a whole were severely affected by the COVID-19 pandemic since educational institutions had to close, forcing students to study from home [24,25,27–31]. The lockdown disrupted teaching, academic meetings, and exams, leading to the majority of them being canceled [32]. UNESCO, the United Nations Educational, Scientific, and Cultural Organization, stated that 1.2 billion university and school students worldwide (around 70% of the world's student population) suffered the closures of schools and universities because of the COVID-19 pandemic [24,28,29].

During the new pandemic (COVID-19), large numbers of people around the world began to use various software packages to help students learn due to the shutdown restrictions imposed [22,27]. As a substitute for the suspended face-to-face mode of teaching (due to the COVID-19 pandemic restrictions) and to ensure that educational institutions could continue to provide classes, the Internet (online learning) was the emergency solution [28,33–36]. Through the Internet, students were able to access applications, courses, and online libraries, where lectures were conducted via various video conferencing platforms, e.g., Google Meet, Skype, Cisco Webex, Microsoft Teams, and Zoom [28,30,32].

While certain online learning platforms (e.g., video conferencing) were utilized prior to the COVID-19 pandemic, they became more of a necessity than an option, especially with the restriction measures applied [36]. The COVID-19 pandemic has changed educational demands, enabling pupils to learn the newest technology, e.g., laptops and smartphones [30].

Despite its superior advantages, during the pandemic, students who had previously studied mostly via the face-to-face mode were unprepared for the swift shift to online learning and the adoption of new technologies [31,34]. Since the COVID-19 epidemic, there has been a steady return to face-to-face education, although many disciplines are still delivered online [36]. Events like the COVID-19 pandemic show how important it is to make the education system more digital [37].

### 2.2. Online Learning

Human-to-human connection is a fundamental component of our lives, highlighting the huge impact that interpersonal relationships have on the way we live and interact [32]. Technology have become a pillar of education, transforming the way that knowledge is

taught and learned [38]. As a result of this technological integration, online learning has emerged as a revolutionary method in education, offering students unmatched access to a multitude of learning opportunities and materials [38]. The way that technology and human connection work together to create a dynamic synergy highlights how education is changing and how traditional values of interaction are meeting the limitless opportunities presented by digital innovation.

Online education's reliance on the Internet has driven governments and Internet providers to speed up the Internet worldwide, where education is becoming more accessible to everyone [25]. Scholars interested in online learning study not only its usability but also areas related to its mobility, connectivity, and interactivity [38]. Online learning will remain a key component of higher education, regardless of how people feel about it [38].

Video conferencing is a practical way to conduct face-to-face meetings with people in different places [32]. The Oxford Dictionary explains video conferences as "meetings in which persons from diverse locations communicate via voice and video" [39]. Initially, video conferencing was only utilized a decade ago to eliminate needless business travel, lowering spending on accommodation and travel, and saving time [22]. Video conferencing platforms play a vital role in various areas, e.g., health, conferences, business, etc. [32]. During the COVID-19 lockdown, video conferencing became increasingly popular [40]. Video conferencing may be used in classrooms, for job interviews, for research conferences, and more [32]. Video conferencing platforms facilitate connectivity for organizations, institutions, the public, and corporations to satisfy their daily meeting and discussion needs [32].

The appeal of online learning and video conferencing to students is attributed to its flexibility in the form of convenience, participation, resource accessibility, time management, and ease of access [25,38]. Despite the disadvantages of online learning, there are some benefits—the number of students who withdraw is lower and enrollment rates are higher. In addition, from a financial perspective, it is more cost-effective (for both universities and students, due to lower tuition fees) than traditional forms of teaching [38,40].

Although video communication platforms for online learning have proven to be advantageous in certain situations, they also have disadvantages. Since meetings are conducted virtually, a lack of interaction (loss of body language) may exist, particularly when the attendees have never met before [32], and this can make communication less effective. Due to the suddenness of the changes that occurred due to the pandemic, most schools were unprepared.

Due to the elimination of face-to-face teaching, practical lab courses were challenging to complete [25]. In addition, teachers struggled to teach deaf, blind, and autistic students and the more their schooling was interrupted, the more they forgot [25]. Miscommunication, the absence of a physical connection, and inadequate monitoring are some of the web conferencing drawbacks for online education [29]. Since teachers do not physically monitor tests, students are enticed to cheat [25].

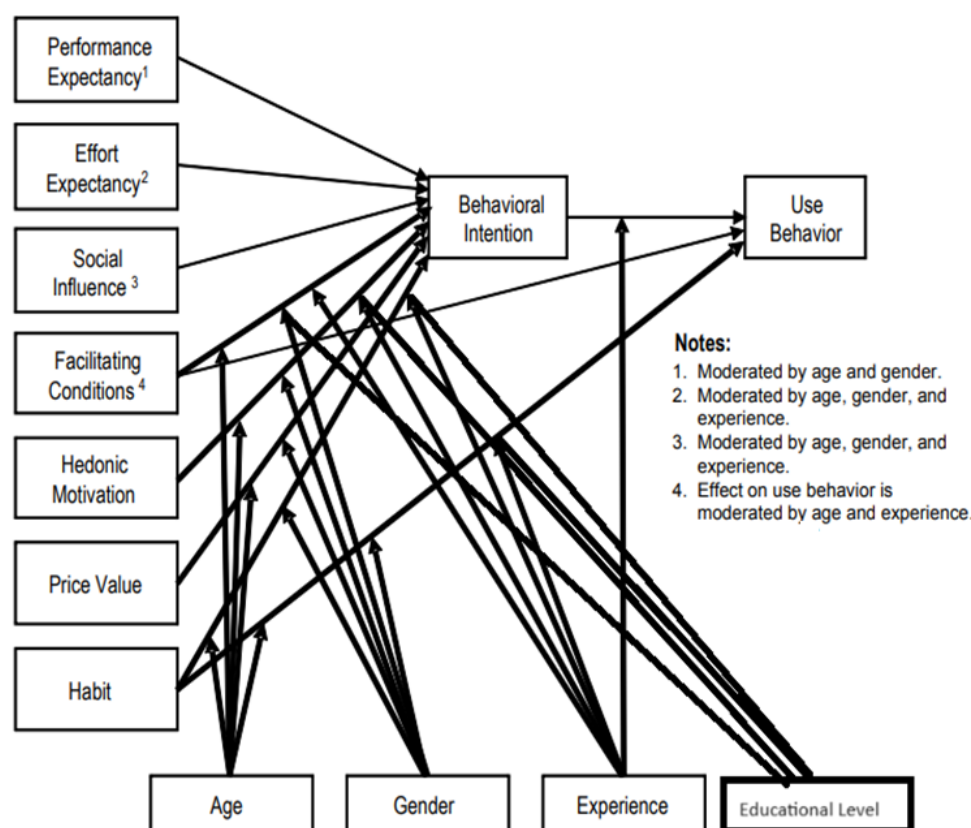
In the COVID-19 emergency, numerous university students experienced worry and anxiousness [35]. Students often felt alone, intimidated, or afraid to speak out [38]. Many struggled to enhance their self-tutorship, a crucial skill that must be encouraged [25]. Furthermore, from a technical perspective, accessibility, availability, the speed of the Internet, and the energy supply in different regions of the globe hampered online learning [25]. Sound lags and poor image and sound resolution may occur due to technical issues, and video communication platforms are exposed to security risks as they can be hacked [32].

Because they study on gadgets connected to the Internet, pupils' attention spans are frequently interrupted [25]. The lack of immediacy and non-verbal cues and low engagement and involvement were big concerns [38]. Many of those issues hindered students' cognitive and creative development [38]. A study by [41] revealed that almost all of their participants saw online courses as personalizing learning and as reducing contact [38]. Students mentioned feeling disconnected from their lecturers, the course material, and their peers and not talking in lessons, and many found the online environment unpleasant [38].



### 2.3. Hypothesis Development

UTAUT2 has been employed to study how students accept and utilize technology in the classroom for a variety of purposes [42,43]. Such applications in this regard include, for example, Google Classroom, Learning Management Systems (LMSs), Massive Open Online Courses (MOOC), and lecture capture systems [42]. UTAUT and UTAUT2 share the same first four elements (i.e., effort expectancy, facilitating conditions, social influence, and performance expectancy), but UTAUT2 has three more elements: habit, price value, and hedonic motivation [42]. The UTAUT2 model contains seven constructs, but in this study, only six factors were used (see Figure 1). The price value was removed from the originally proposed model because it is not appropriate for the educational context—video conferencing tools are free for students.



**Figure 1.** Adapted UTAUT2 Model [14].

A study by [44] states that the utilization of UTAUT2 to examine e-learning is deemed scarce. A study by [14] advocates for and deems it necessary to use UTAUT2 in different geographical areas for model validation. While many studies have applied the UTAUT model to explore the behavioral intentions of learners toward technology, its utilization in this field of study is rare [45].

Based on 161 studies published between 2007 and 2016, a meta-analysis found that UTAUT's four independent variables had low or moderate effects on users' behavior and intentions to change [45]. In UTAUT2, the explanatory power of behavioral intention grew from 56 to 74%, whereas use behavior rose from 40 to 52%. This is the highest ranking of the available models [45].

Several studies in the education sector have applied the UTAUT2 theory to comprehend the acceptability and utilization of technology. A study by [46] used the UTAUT2 theory to determine the elements influencing Jordanian university students' real use of social networking platforms for learning. The study employed the UTAUT2 framework to enhance comprehension of the factors influencing the acceptance and use of technology.

Moreover, ref. [47] utilized the UTAUT2 theory to forecast the level of acceptance of blended learning among university students in Zimbabwe, which combines both face-to-face and online instructional methods. The researcher confirmed the usefulness of the UTAUT2 model in forecasting students' behavioral intentions toward technology acceptance.

The following figure (Figure 1) is an adapted version of The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), and we refer to it as the adapted UTAUT2. The figure shows that in total, there are eight constructs of UTAUT2: performance expectancy (PE), effort expectancy (EE), social influences (SI), facilitating conditions (FC), hedonic motivation (HM), habit (HT), behavioral intention (BI), and use behavior (USE). The price value (PV) construct is excluded as students use the video conferencing tools for free. The arrows from the six constructs on the left side of the figure (UTAUT2 model) (PE, EE, SI, FC, HM, and HT to the BI and USE constructs) are used to show the relationships between PE, EE, SI, FC, HM, and HT and the behavioral intention and USE constructs; these arrows are going to build the hypothesis (explained in Sections 2.3.1–2.3.7). Figure 1 shows three moderators from UTAUT2, age, gender, and experience, plus a new moderator, which is educational level. These moderators moderate the relationship between the six constructs (PE, EE, SI, HM, FC, HT) and BI and USE (explained in Section 2.3.8).

In Turkey, ref. [48] carried out research during the COVID-19 pandemic to examine the levels of adoption and utilization of remote education systems among medical educators. The study employed the UTAUT2 framework to examine the contextual variables that influenced the adoption and utilization of technology. A comprehensive synthesis of 39 empirical studies in educational settings conducted by [49] revealed that the UTAUT2 model demonstrated utility in accurately predicting the adoption and utilization of technology within educational environments.

A research study by [50] was conducted using the expanded UTAUT2 as its theoretical framework to examine the factors influencing instructors' acceptance and utilization of MOOCs. The study's outcomes demonstrated that the UTAUT2 model proved to be valuable in comprehending the extent to which educators embraced MOOCs. A study by [51] conducted research in Greece to examine the variables that can predict the behavioral intention of university students to utilize e-Learning platforms in the post-pandemic era (COVID-19). This study employed the UTAUT2 model, specifically focusing on the construct of 'Learning Value', in order to examine students' inclination toward utilizing technology.

While the UTAUT2 theory has been extensively employed, the model has been subject to criticism in several studies. To further explain this, the UTAUT2 model primarily emphasizes individual-level factors that play a role in the acceptance and utilization of technology. However, it fails to consider the significance of broader contextual factors, such as organizational or cultural influences, which may also be crucial in understanding technology adoption and usage [52]. Moreover, insufficient consideration of emotional factors is considered another limitation of UTAUT2. The model does not explicitly incorporate the influence of emotions on the acceptance and utilization of technology, despite the potential significance of this component in some circumstances [52]. The UTAUT2 model's generalizability is constrained due to its development being rooted in studies conducted only within Western cultures [52], meaning that its potential applicability to different cultural and contextual settings may be limited.

The UTAUT2 model places a strong focus on the role of behavioral intention in predicting technology usage. However, it is important to note that intention does not necessarily result in actual utilization, as mentioned by [53]. According to [54], the UTAUT2 model has been criticized for its omission of components pertaining to trust and perceived risk, which are deemed significant determinants in the acceptance and utilization of technology.

Based on the discussion above, UTAUT2 has been chosen to be the primary model in this study to study students' acceptance and use of video conferencing tools. Furthermore, there are other reasons for its adoption. UTAUT2 is a robust model that is built based on UTAUT. Ref. [55] formulated the Unified Theory of Acceptance and Use of Technology (UTAUT) to address gaps in existing acceptance frameworks and to delve into student

technology adoption within organizational settings. The Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behavior (TPB), the Combined TAM and TPB, the Model of PC Utilization, the Diffusion of Innovation Theory (DoI), and the Social Cognitive Theory (SCT) were all carefully looked at before UTAUT was created. UTAUT2 targets consumer settings (i.e., students) rather than organization settings like UTAUT. Also, the UTAUT2 model has been implemented and tested in many studies and in different contexts.

### 2.3.1. Performance Expectancy

Performance expectancy (PE) is defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance” [56] (p. 447). Previous research has elicited that PE is a significant predictor of behavioral intention [55,57].

Several studies [58,59] have shown that PE positively affects the propensity to use services or products that are technically innovative [60]. Furthermore, ref. [60] conducted a study to explain the variables that influence Spanish higher education students’ intent to use serious games (management education). The results of the study revealed that PE was the variable that had the most influence on students’ intent to use serious games [60]. Therefore, PE is an important part of raising a person’s expectations and learning beliefs, which helps students achieve good grades [30,60].

According to [61], in Estonia, PE was found to predict instructors’ behavioral intention (BI) toward using mobile devices while instructing, while in the Philippines, the study provided evidence that PE is a significant predictor of teachers’ BI to use technology, especially mobile technology, within the educational setting (classroom). Furthermore, PE has been found to have a positive impact on the BI of university students to utilize mobile learning devices in several countries, including Taiwan, the USA, Indonesia, India, and Germany [61].

Another study carried out by [62] in Guyana employed the UTAUT framework to elucidate the factors influencing the adoption of mobile learning in the context of higher education. It was determined that PE exhibited a significant influence on individuals’ BI to adopt and utilize technology. Ref. [46] employed the UTAUT2 theory in order to ascertain the factors that impact the actual utilization of social networking platforms for educational purposes among university students in Jordan. PE emerged as a noteworthy predictor of individuals’ inclination to adopt and utilize technology.

In the context of a post-pandemic (COVID-19) environment, a research study by [51] examined the determinants that forecast Greek university students’ willingness to utilize e-Learning platforms. Employing the UTAUT2 model and incorporating the aspect of ‘Learning Value,’ the investigation delved into students’ intentions regarding the adoption of technology. Notably, the study revealed that PE played a significant role in shaping students’ BI. A further research endeavor was undertaken by [63] to explore the many aspects that influence the sustained intention of college students in China to utilize an online course platform. This investigation revealed that PE was employed as a means to articulate the expectations held by college students about their ability to enhance their academic performance. From the previous arguments, the first hypothesis of the present work is as follows:

**H1:** *Performance expectancy (PE) has a positive effect on university students’ behavioral intention to use video conferencing tools.*

### 2.3.2. Effort Expectancy

A study by [55] defined effort expectancy (EE) as “the degree of ease of using a system”. Simply put, EE is how simple a new technology product or service is to use [60]. Applying this definition to the educational context, teachers decide whether or not they will use video conferencing based on how hard they think it will be to use, or how much effort it



will require [39]. According to [14,64], EE influences BI. A person's willingness to use a new system can be anticipated not only by how much they like the system, but also by how easy it is to use and how little effort it takes [65].

As aforementioned, certain studies (i.e., [58,59]) have also indicated that EE positively affects the propensity to use services or products that are technically innovative [60]. Furthermore, ref. [60], a study on the variables that influence Spanish university students' intent to use serious games (management education), found that EE played a big role in the acceptance of serious games.

According to [61], the intentions of secondary school teachers in many countries, including Saudi Arabia, Taiwan, Indonesia, India, and Germany, to include mobile technology or other forms of technology in the classroom were influenced by their perception of EE. The EE concept has been found to have an impact on the willingness of instructors and students to adopt and utilize the Internet on mobile devices.

Ref. [66] conducted a study that utilized and expanded upon the UTAUT model in order to identify the elements that influence the BI of university students in central Taiwan to adopt mobile learning. The research revealed that EE played a significant role in predicting the acceptance of technology.

In Greece, a research study by [61] employing the UTAUT model investigated the factors influencing teachers' inclination to use and actual utilization of mobile Internet in their teaching practices. According to the study, EE emerged as a noteworthy predictor of teachers' intent to employ mobile Internet for teaching purposes. In 2022, [47] employed the UTAUT2 theory to predict the degree of receptiveness exhibited by university students in Zimbabwe toward blended learning, a pedagogical approach that integrates both in-person and online instructional methods. The research results indicated that EE significantly influenced the intention to utilize technology. Ref. [51] conducted a study aimed at exploring the factors that could predict Greek university students' willingness to use e-Learning platforms in the period following the pandemic (COVID-19). The study discovered that students' BIs were highly influenced by EE.

Another study by [67] expanded upon the UTAUT model to elucidate the elements influencing the use of online learning systems during the COVID-19 pandemic among Filipino college students. The study's findings underscored the importance of EE as a substantial predictor of BI to utilize technology. From the previous arguments, the second hypothesis of the present work is as follows:

**H2:** *Effort expectancy has a positive effect on university students' behavioral intention to use video conferencing tools.*

### 2.3.3. Social Influence

Social Influence (SI) in this context refers to the extent to which an individual thinks that people who are important to them, such as close friends, family, and co-workers (social pressure), think they should use a system, compelling a certain behavior [43,60,68]. Two studies conducted by [43] found that the decision to use online formative feedback was affected by SI. Groupmates' influence strongly impacts individuals' behavior and plans to employ technology such as Google Apps and the iPad for interactive learning [47]. Ref. [14] argues that SI has a direct effect on BI. Reviewing a number of online cases (i.e., e-Learning, blended learning acceptance, MOOCs, LMSs, and emerging information technology), ref. [43] found that SI affects how people plan to use technology.

In Jordanian universities, a research study was undertaken by [46] to uncover the elements influencing students' practical utilization of social networking sites for educational objectives. The study expanded on the UTAUT2 model. According to the study, the research indicated that SI played a substantial role as a predictor of the effective utilization of social networking sites for educational reasons. Another research study [69] explored the determinants influencing college students' continuing intention to utilize an online course

platform across three countries: Poland, Thailand, and Pakistan. The study revealed that SI played a notable role as a significant predictor of the intention to use technology.

In Greece, a research investigation was carried out by [61] to analyze the elements influencing the intention to use and utilization of mobile Internet among Greek teachers in their teaching practices. This study, which employed the UTAUT model as its framework, revealed that SI played a significant role in shaping the inclination of teachers and students to incorporate technology, including mobile technology, into their classroom practices. In addition, a research study by [70] utilized and expanded upon the UTAUT model to identify the elements that contribute to the intention to adopt mobile learning. According to the findings of the study, SI is a pivotal predictor of technology acceptance. From the previous arguments, the third hypothesis of the present work is as follows:

**H3:** *Social Influence has a positive effect on university students' behavioral intention to use video conferencing tools.*

#### 2.3.4. Facilitating Conditions

Facilitating conditions (FC) indicate how much a user anticipates having access to technical help and organizational infrastructure during system usage [55]. So, it can be said that FC affects both the intention to behave in a certain way (BI) and the actual behavior [43].

In their research endeavor, ref. [71] examined the factors that influence the utilization of digital learning materials by teachers in Hong Kong utilizing the UTAUT2 model. The study's findings underscored the notable role of FC as a key determinant in predicting teachers' inclination to employ technology in their educational practices. A study by [72] used the UTAUT2 model to investigate the factors influencing teachers' use of digital learning tools in Turkey. According to the findings, there is a direct and linear relationship between FC, BI, and actual use behavior. Ref. [46] conducted a research study in Jordanian universities to identify the factors that affect students' real-world usage of social networking sites for educational purposes. The study revealed that FC directly influenced actual usage. From the previous arguments, the fourth and fifth hypothesis of the present work are as follows:

**H4:** *Facilitating conditions have a positive effect on university students' behavioral intention to use video conferencing tools.*

**H5:** *Facilitating conditions have a positive effect on university students' use behavior of video conferencing tools.*

#### 2.3.5. Hedonic Motivation

Hedonic Motivation (HM) can be described as how much a user hopes that utilizing a system will be pleasurable [43]. A study by [14] suggest that hedonic motivation has a direct effect on BI. Ref. [73] mentioned that hedonic motivation affected BI when online formative feedback was used. A study conducted in Jordan by [74], revealed that HM exerted a notable influence on the BI of secondary school instructors to integrate mobile technology into their teaching practices. Additionally, HM was found to have an impact on students' acceptance of mobile learning. From the previous arguments, the sixth hypothesis of the present work is as follows:

**H6:** *Hedonic motivation has a positive effect on university students' behavioral intention to use video conferencing tools.*

#### 2.3.6. Habit

According to [55], habit (HT) is the extent to which a person automatically anticipates that activities will be carried out as a consequence of learning after using a technology [39,43,68]. So, when people use technology often, HT forms [68]. Ref. [73] mentioned

that HT affected BI when utilizing online formative feedback. This outcome is also supported by [14], which affirms that HT affects BI in a direct way.

Ref. [75] conducted a study to investigate the impact of mobile technology adoption among secondary school teachers in Malaysia. The UTAUT2 model was employed as the theoretical framework. Habit demonstrated a positive effect on the practical utilization of technology by teachers. Moreover, it exerted a significant influence on the inclination of educators and pupils to adopt and employ the Internet on mobile devices. From the previous arguments, the seventh and eighth hypotheses of the present work are as follows:

**H7:** *Habit has a positive effect on university students' behavioral intention to use video conferencing tools.*

**H8:** *Habit has a positive effect on university students' use behavior regarding video conferencing tools.*

### 2.3.7. Behavioral Intention

Ref. [55] defines BI as “the motivational factor driving a user to use a particular system/technology in the future, and behavioral use is the actual use of the system/technology”. Ref. [76] argued that users with a strong BI are likely to carry out that specific behavior. According to [24], several studies have shown that BI has a direct and significant effect on how a system is used. According to [77], the strength of individuals' commitment to engage with particular activities can be assessed using their BI. From the previous arguments, the ninth hypothesis of the present work is as follows:

**H9:** *Behavioral intention has a positive effect on students' behavior regarding the use of video conferencing tools.*

### 2.3.8. The Moderating Effects on Students' Acceptance and Use of Video Conferencing Tools

This study contains the UTAUT2 moderators of experience, age, and gender plus educational level. Figure 1 shows that there are sex constructs of the UTAUT2 model plus BI and USE; price value is excluded as students do not pay for video conferencing tools. The arrows from each construct to BI and USE in Figure 1 are used to show the relationships between the sex constructs on the left size of Figure 1 (UTAUT2 mode): PE, EE, SI, FC, HM, and HT and the behavioral intention and use constructs. These arrows are also used to build hypotheses H1 to H13. Furthermore, the arrows from the moderators to the links between constructs (PE, EE, SI, FC, HM, and Hm) and BI/USE represent how moderators such as age moderate the relationship between PF and BI.

Education level (year of study) is a new moderator that represents the year of study of undergraduate students at the University of Technology and Applied Sciences. This moderator tests whether the year of study moderates the effect of determinants on BI and the use of video conferencing tools. From the previous arguments and based on the UTAUT2 model, the next four hypotheses of the present work are as follows:

**H10a:** *Educational level moderates facilitating conditions and behavioral intention.*

**H10b:** *Educational level moderates the relationship between hedonic motivation and behavioral intention.*

**H10c:** *Educational level moderates the relationship between habit and behavioral intention.*

**H10d:** *Educational level moderates the relationship between habit and use behavior.*

Experience is a moderator in the UTAUT and UTAUT2 models. It is defined as mobile Internet usage experience [78]. In this study, experience represents the prior experience

of using video conferencing tools such as Google Meet, MS Teams, Zoom, etc. This study tests whether experience moderates the effects of determinants on BI and the use of video conferencing tools.

A research study by [79] delved into the moderating influence of teachers' experience and background on their inclination to incorporate gamification into online learning activities. According to the study's findings, experience played a notable and significant moderating role in the connection between perceived usefulness and the intention to employ gamification. From the previous arguments and based on the adapted UTAUT2 model, the next four hypotheses of the present work are as follows:

**H11a:** *Experience moderates facilitating conditions and behavioral intention.*

**H11b:** *Experience moderates the relationship between hedonic motivation and behavioral intention.*

**H11c:** *Experience moderates the relationship between habit and behavioral intention.*

**H11d:** *Experience moderates the relationship between habit and use behavior.*

Age is a moderator in UTAUT and UTAUT2. It has an impact on all seven core constructs that affect users' intention and use of technology [78]. This study tests whether age moderates the effect of determinants on BI and the use of video conferencing tools. From the previous arguments and based on adapted UTAUT2 model, the next four hypotheses of the present work are as follows:

**H12a:** *Age moderates facilitating conditions and behavioral intention.*

**H12b:** *Age moderates the relationship between hedonic motivation and behavioral intention.*

**H12c:** *Age moderates the relationship between habit and behavioral intention.*

**H12d:** *Age moderates the relationship between habit and use behavior.*

Gender is a moderator in UTAUT and UTAUT2, like the age moderator, and it also has an impact on all seven core constructs that affect users' intention to use and use of technology [78]. This study tests whether gender moderates the effect of determinants on BI and the use of video conferencing tools.

In Turkey, a study conducted in 2023 by [48] investigated the extent to which remote education systems were adopted and utilized by medical educators during the COVID-19 pandemic. The study discovered that male participants outperformed female participants in all model configurations. From the previous arguments and based on the adapted UTAUT2 model, the next four hypotheses of the present work are as follows:

**H13a:** *Gender moderates facilitating conditions and behavioral intention.*

**H13b:** *Gender moderates the relationship between hedonic motivation and behavioral intention.*

**H13c:** *Gender moderates the relationship between habit and behavioral intention.*

**H13d:** *Gender moderates the relationship between habit and use behavior.*

### 3. Research Methodology

#### 3.1. Data Collection

A survey is a quantitative method that uses predetermined questions and aims to find out people's opinion, preferences, beliefs, methods, or characteristics. Ref. [80] assert the strength of surveys. As a result, they are used to test hypothesized relationships focusing

on technology acceptance. The constructs and moderators used within the conceptual models and their relationship were developed and validated in models and theories of technology acceptance. As aforementioned, for this study, a quantitative research approach was employed to evaluate the research model, similar to previous studies on technology acceptance. To test our hypotheses and moderators, this study uses the structural equation modeling (SEM) approach.

The target sample for this study was Omani undergraduate students, both males and females, studying full-time at the University of Technology and Applied Sciences (UTAS). After receiving ethical approval from the University of Technology and Applied Sciences, a pilot study was conducted with 50 randomly selected participants in order to test the readability and validity of the questionnaire items.

An online survey was created using Google Forms and sent to undergraduate business students by email. The data were collected during the academic year 2022/2023. The students were informed about the aim of the study, and they were informed that participating in this online survey was voluntary and that they could withdraw at any time. The online survey usually took less than 9 min to complete. To ensure no bias in the results of the study, no rewards were given to the students to ensure that they wrote their honest perceptions about the items of the survey without any external confounding effect.

A reminder email was sent to chase up responses, and two hundred responses were collected. All the questions were mandatory; therefore, the obtained data were suitable for analysis using structural equation modeling (SEM) to assess the measurement model.

### 3.2. Measurement

All the items (questions) used in this study were drawn from the literature, where they were quoted to be valid and reliable to measure constructs of the phenomena they intended to represent (Appendix A). The online survey contained 28 questions taken from the literature. The survey was divided into two sections. The first section included questions related to demographic data such as age, gender, experience, and educational level. These questions were taken from the literature. The second section contained questions to measure the UTAUT2 model constructs and answer the research question. The UTAUT2 model constructs used in this study were PE, EE, SI, FC, HM, HT, BI, and USE. These constructs were measured using 4, 4, 3, 4, 3, 3, 3, and 4 items, respectively.

The survey questions were adopted from the UTAUT2 survey, with all constructs measured using a seven-point Likert scale. The items were adapted from Venkatesh et al. (2012) and the scale ranged from 1 to 7 (1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = agree, 7 = strongly agree) (see Appendix A).

## 4. Data Analysis and Results

Table 1 displays the characteristics of the sample. Given that most of the students at the university were female, it was expected that the sample consisted mostly of females (69.2%). The majority (59.2%) of students were between the ages of 18 and 21. Regarding educational level, 29.5% were second-year students and 38% were skilled in utilizing remote learning technologies to accelerate virtual learning.

To assess the research model and hypotheses, WarpPLS, an advanced multivariate partial-least-squares structural equation modeling (PLS-SEM) tool was used (Version 8.0) [81]. This method includes the estimation of two discrete models, a measurement model (outer model) and a structural model, and it does not presuppose normality (inner model). The data set was examined since SEM requires that data do not deviate from the assumption of normality. Kurtosis varied from  $-0.435$  to  $1.825$ , and skewness ranged from  $-1.403$  to  $-0.231$ .



**Table 1.** Sample characteristics.

Characteristic	N = 200	%
Gender		
Male	62	30.8
Female	139	69.2
Age (years)		
Less than 18	13	6.5
18–21	119	59.2
22–25	69	34.3
Educational level		
Foundation	48	23.9
1st year	48	23.9
2nd year	59	29.4
3rd year	46	22.9
Experience		
No experience	10	5.0
Some experience	53	26.4
Experienced	78	38.8
Very experienced	60	29.9

#### 4.1. The Measurement Model

We initially examined the measurement model's internal consistency (reliability) and convergent validity (validity). As a result, we examined variables like factor loadings, composite reliability, Cronbach's alpha, average variance extracted (AVE), and variance inflation factor. Thereafter, item loadings were used for construct validity testing (see Appendix B). Cronbach's alpha values (Table 2) reflect the extent to which the items on the instrument account for the instrument's behavior. These were more reliable than the minimum requirement of 0.7 (range: 0.783–0.957). Good convergent validity was shown by an AVE greater than 0.5 (range, 0.643–0.936), which is the minimum value for acceptability when examining the amount of variation in the indicators explained by the latent construct [82]. In addition, there was no evidence of multicollinearity or common method bias since all the variables had VIF values below 5 (range: 1.389–4.896) [83].

**Table 2.** Convergent validity.

Variable	Composite Reliability	Cronbach's Alpha	AVE	VIF
Performance expectancy (PE)	0.957	0.940	0.848	4.896
Effort expectancy (EE)	0.946	0.887	0.898	4.474
Social influence (SI)	0.967	0.932	0.936	4.216
Facilitating conditions (FC)	0.950	0.921	0.864	4.747
Hedonic motivation (HM)	0.783	0.445	0.643	2.251
Habit (HA)	0.937	0.899	0.833	4.307
Behavioral intention (BI)	0.948	0.890	0.901	4.138
Use behavior (USE)	0.928	0.897	0.764	1.389

Note. AVE = average variance extracted; VIF = variance inflation factor.

As a further step, we calculated the square roots of AVE, which demonstrate the measurements' ability to discriminate across groups (see Table 3). The tests conducted in a study by [84] have recently been criticized for allegedly failing to reveal a lack of discriminant validity in typical research populations [85]. Therefore, ref. [85] presented an alternative technique that emphasizes the multitrait-multimethod matrix: the heterotrait-monotrait (HTMT) ratio of correlations to estimate discriminant validity [85]. Table 4 displays the results of using this unique approach to verify discriminant validity. Problems with discriminant validity emerge if the HTMT value is greater than 0.90 [81]. In this case. The discriminant validity is adequate across all study constructs, with values between 0.407 and 0.899.

**Table 3.** Discriminant validity.

Constructs	1	2	3	4	5	6	7	8
PE	(0.921)							
EE	0.867	(0.948)						
SI	0.793	0.767	(0.968)					
FC	0.838	0.861	0.811	(0.929)				
HM	0.696	0.637	0.631	0.649	(0.802)			
HA	0.831	0.813	0.810	0.833	0.703	(0.913)		
BI	0.770	0.764	0.815	0.805	0.644	0.820	(0.949)	
UB	0.467	0.411	0.416	0.420	0.272	0.442	0.391	(0.874)

**Table 4.** Heterotrait–monotrait (HTMT) ratios of correlation.

Construct	1	2	3	4	5	6	7	8
PE								
EE	0.899							
SI	0.868	0.828						
FC	0.891	0.831	0.883					
HM	0.893	0.842	0.890	0.811				
HA	0.895	0.857	0.886	0.824	0.800			
BI	0.834	0.798	0.864	0.876	0.807	0.804		
UB	0.508	0.475	0.439	0.466	0.407	0.490	0.439	

Note. HTMT ratios are good if  $<0.90$ , and best if  $<0.85$ .

#### 4.2. The Structural Model

The use of goodness-of-fit indicators, beta ( $\beta$ ), and  $R^2$  is proposed in the structural model developed by [82]. The standardized root-mean-square residual (SRMR) was proposed as the only criterion for evaluating the fit of an estimated model by [86]. A value of 0 for the SRMR indicates a perfect fit, whereas values below 0.1 are generally regarded to be satisfactory for PLS path models [81]. We had a respectable SRMR of 0.057, suggesting a good model fit.

Table 5 illustrates the structural model's  $p$  values and path coefficients (betas). SI ( $\beta = 0.264$ ;  $p < 0.01$ ), FC ( $\beta = 0.245$ ;  $p < 0.01$ ), HM ( $\beta = 0.591$ ;  $p = 0.011$ ), and HT ( $\beta = 0.262$ ;  $p < 0.01$ ) have a strong positive impact on BI. As a result, H3, H4, H6, and H7 are supported. Furthermore, FC, HT, and BI positively affect use behavior ( $\beta = 0.203$ ;  $p = 0.002$ ;  $\beta = 0.240$ ;  $p < 0.01$ ;  $\beta = 0.405$ ;  $p < 0.01$ , respectively). Thus, H5, H8, and H9 are supported. On the other hand, PE ( $\beta = 0.020$ ;  $p = 0.389$ ) and EE ( $\beta = 0.007$ ;  $p = 0.458$ ) have no positive effect on BI. Therefore, H1 and H2 are not supported. Similarly, all moderation hypotheses are rejected, except for the educational level ( $\beta = 0.571$ ;  $p = 0.011$ ), which moderates the relationship between HT and BI (H8.c).

Furthermore, BI explains 78% of the variance in PE, EE, SI, FC, hedonic motivation, and habit ( $R^2 = 0.78$ ). Additionally, use behavior explains 21% of the variance in BI, FC, and habit ( $R^2 = 0.21$ ).

**Table 5.** Hypotheses-testing summary.

No.	Hypotheses	Beta	$p$ -Value	Supported?
H1	Performance expectancy positively affects behavioral intention	0.020	0.389	No
H2	Effort expectancy positively affects behavioral intention	0.007	0.458	No
H3	Social influence positively affects behavioral intention	0.264	$<0.001$	Yes
H4	Facilitating conditions positively affect behavioral intention	0.245	$<0.001$	Yes
H5	Facilitating conditions positively affect use behavior	0.203	0.002	Yes
H6	Hedonic motivation positively affects behavioral intention	0.159	0.011	Yes

Table 5. Cont.

No.	Hypotheses	Beta	p-Value	Supported?
H7	Habit positively affects behavioral intention	0.262	<0.001	Yes
H8	Habit positively affects use behavior	0.240	<0.001	Yes
H9	Behavioral intention positively affects use behavior	0.405	<0.001	Yes
H10a	Educational level moderates facilitating conditions and behavioral intention	0.098	0.080	No
H10b	Educational level moderates the relationship between hedonic motivation and behavioral intention	0.065	0.176	No
H10c	Educational level moderates the relationship between habit and behavioral intention	0.157	0.011	Yes
H10d	Educational level moderates the relationship between habit and use behavior	0.085	0.110	No
H11a	Experience moderates facilitating conditions and behavioral intention	0.039	0.291	No
H11b	Experience moderates the relationship between hedonic motivation and behavioral intention	0.084	0.115	No
H11c	Experience moderates the relationship between habit and behavioral intention	0.096	0.084	No
H11d	Experience moderates the relationship between habit and use behavior	0.083	0.116	No
H12a	Age moderates facilitating conditions and behavioral intention	0.93	0.091	No
H12b	Age moderates the relationship between hedonic motivation and behavioral intention	0.037	0.299	No
H12c	Age moderates the relationship between habit and behavioral intention	0.027	0.351	No
H12d	Age moderates the relationship between habit and use behavior	0.087	0.105	No
H13a	Gender moderates facilitating conditions and behavioral intention	0.032	0.322	No
H13b	Gender moderates the relationship between hedonic motivation and behavioral intention	0.008	0.453	No
H13c	Gender moderates the relationship between habit and behavioral intention	0.063	0.182	No
H13d	Gender moderates the relationship between habit and use behavior	0.083	0.118	No

## 5. Discussion

A random sample of 200 university students from an Omani business college was selected. Using UTAUT2, this research aimed to uncover the factors that influenced students' acceptance and usage of multiple video communication services as their principal learning tool during the COVID-19 pandemic. Overall, the study revealed that, in contrast to expectations regarding performance and effort, social influence, facilitating conditions, hedonic motivation, and habits all have a positive impact on behavioral intention. Additionally, experience is the only factor that acts as a moderator in the link between behavioral intention and habit. The current study's findings are elaborated upon below.

Our data indicate that social influence, facilitating conditions, hedonic motivation, and habit had a significant positive effect on students' behavioral intention to use video communication services as their primary learning tool during the COVID-19 pandemic. These findings are in line with the findings of [14,43,73]. They stated that social influence has a direct effect on students' behavioral intention as well as the decision to use online formative feedback. This may be due to peer pressure, positive recommendations from friends and family, and the popularity and perceived normalcy of using such services for learning. Hence, social influence can boost the perception of the utility and usability of video communication services, resulting in greater adoption of the latter. Facilitating conditions are the resources, systems, and structures that encourage and make it simpler for students to participate in a specific behavior [55].

In the context of utilizing video communication services for educational purposes, examples of facilitating conditions include access to a dependable and quick Internet con-

nection, interoperability between devices and platforms, and the availability of appropriate hardware and software. Ref. [43] suggested that the presence of these variables can boost students' perceptions of the ease of use and convenience of video communication services, leading to greater acceptance and usage of these services as their primary learning tool. Another study also recorded how students' hedonic motivation affected their willingness to use video communication services for learning during the COVID-19 pandemic [73]. Regarding habit, ref. [14] concurred that it directly influences students' behavioral intentions. In addition, our study revealed that facilitating conditions, habits, and behavior intention positively influenced the students' utilization of video communication services for learning purposes during the COVID-19 pandemic. Our study findings are in line with those of [87,88], who revealed that during the COVID-19 pandemic, the presence of facilitating conditions, strong habits, and a high level of behavioral intention can all lead to an increase in the usage of video communication services for learning.

Contrary to expectations, performance and effort expectations had no effect on students' intentions to use video communication services in their educational pursuits. These findings disagree with the findings of [65]. This result could be attributable to a number of factors, including students' varying motivations for using video communication services for learning, the perceived usefulness and ease of use of the services, or social influence or facilitating conditions playing a more significant role in determining students' intentions. Additionally, performance and effort requirements may still influence students' actual use behavior, but not their intentions. In any event, the influence of performance and effort expectations on students' usage of video communication services for learning is a subject that could benefit from additional study.

Some factors seem to have no effect on students' attitudes towards using video communication services during their studies, such as expectations, performance, and effort or exertion expectations. Primarily, it could be the case that students managed their expectations regarding the usefulness of these services by other means, too, for instance, by using other methods present in the educational field, as a result of which they didn't see any great need to employ video communication. Additionally, no doubt these students could have found that the usefulness and effort requirements associated with the two apps' usage was no better than other ways to do the work and adopted alternative services. Another factor is contextual to the individual; their perceptions may be based on technological problems, a lack of familiarity with video communication services, or general privacy and security concerns, which might become major reasons for not adopting this form of communication. These findings thus accentuate the value of exploring the mechanisms and contextual aspects that influence the impact of technologically enhanced educational devices on students' intention and practice.

Finally, this study's findings also revealed that the association between behavioral intention and habit is only moderated by educational level. This may suggest that individuals with varying levels of education may react differently to the establishment and influence of habits. Those with greater levels of education may be more susceptible to the influence of habits on their behavioral intentions than those with lower levels of education [89]. Hence, this research emphasizes the importance of incorporating several demographic parameters, such as educational level, when examining the relationship between habits and behavioral goals. Additional research should investigate how educational level and other demographic factors modulate the influence of habits on behavioral intentions and use behavior.

There were a few limitations to this research. The quantitative approach used in this study might introduce response bias. Participants may misunderstand questions or provide socially desirable answers that affect the reliability and accuracy of the results. Qualitative approaches are recommended for future research. Using the UTAUT2 framework, we found that some variables influence the adoption of video communication services to aid learning. A cross-sectional survey was also used to gather data at a single moment. In this regard, future studies could make use of longitudinal study. Future research

should investigate the impact of other variables on the behavioral desire to use video communication services as a learning aid, such as mindsets regarding integrated learning, technology anxiety, experience, self-efficacy, interoperability, and reluctance to change. In addition, future research should investigate the function of moderating factors such as gender, age, experience, and voluntariness. Because the current research was performed on students at the University of Technology and Applied Sciences, the results may not be generalizable to other institutions. We propose that this research be performed at other institutions due to structural variations in the technical and educational areas.

Based on the limitations of the current research, we call for future studies to address potential methodological biases by applying techniques such as broadening the pool of participants using samples from both higher education institutions and vocational training facilities, as well as participants from various educational backgrounds and settings beyond universities. On the other hand, the combination of these approaches will probably result in a comprehensive picture of the issues that may arise during the implementation of video communication platforms in learning. Moreover, cultural and context-specific factors in the area of technology adoption are also important dimensions, which can help researchers gain a better lens through which technology adoption is viewed on a global scale.

### *5.1. Theoretical and Practical Implications*

This study investigates the acceptance and utilization of video communication services as a key teaching tool within the framework of UTAUT2 in the context of the COVID-19 pandemic. The investigation's conclusions have yielded significant implications, both in terms of theoretical and practical ramifications for research.

#### *5.1.1. Theoretical Implications*

The present research enhances the current academic comprehension of technology adoption by employing the UTAUT2 framework inside the realm of education. Hence, this affirms the suitability of this conceptual framework for unconventional organizational contexts. Furthermore, our study's objective is to ascertain the precise UTAUT2 elements that substantially impact students' inclination to embrace video communication services for educational purposes [90]. The factors encompassed in this list comprise effort expectancy, performance expectancy, social influence, facilitating conditions, hedonic motivation, and habit. This study investigates the influence of these characteristics on students' receptiveness toward video communication services inside the educational setting. The utilization of this dataset enables the adaptation and customization of UTAUT2 to better correspond with the specific needs and demands of the education sector. Therefore, we suggest the necessity for further investigation into additional variables that may yield substantial consequences across various contexts.

Furthermore, the outcomes of the current study suggest that the association between habit and behavioral intention is influenced by the individual's level of experience. The findings of this study enhance our comprehension of the intricate relationship between students' adoption of innovative tools and their prior technological knowledge. This study examines the influence of prior experiences on students' inclination to utilize video communication services for educational purposes. Further research is required to determine the impact of digital literacy, cultural factors, privacy, and security concerns on the use of video communication platforms among students in different nations and regions. The influence of cultural norms and values on the adoption and utilization of technology can have a substantial effect. In addition, our study establishes a foundation for future investigations into the incorporation of technology within the realm of education. Further investigation is required into the intricacies of various technologies and surroundings, alongside the changing preferences and requirements of learners as they acclimatize to novel educational paradigms.



### 5.1.2. Practical Implications

Academic institutions, such as the University of Technology and Applied Sciences in Oman, may contemplate modifying their strategies pertaining to the implementation and promotion of video communication services for educational objectives by drawing upon the insights derived from this research. To optimize students' utilization of these technologies, it may be beneficial to underscore the significance of hedonic incentives and societal impact. Furthermore, gaining an understanding of the variables that impact students' acceptance of video communication services can facilitate the development and deployment of instructional technology platforms that are both user-friendly and efficacious. One plausible strategy for educators and developers to reduce the perceived cognitive load and enhance the expected efficacy of these technologies is to prioritize the enhancement of their usability.

Additionally, educational institutions can offer guidance and assistance to students, particularly those without practical knowledge, with the aim of bridging the disparity between customary conduct and desired conduct. By engaging in this process, educators can support students in developing the habit of accessing these resources for educational purposes. The findings of this study can be utilized by policymakers and educational administrators to gain significant insights for the enhancement of the curriculum, allocation of resources, and integration of technology. This strategy guarantees that the incorporation of technology is in accordance with students' preferences and requirements. To provide further clarification, our research findings illustrate the positive influence of social influence, supportive settings, positive emotion, and habit formation on the formation of behavioral intention. On the other hand, they argue that facilitating conditions have a huge impact on intentions to use the technology or its actual usage, and performance expectancy and effort expectancy have almost no impact. This has fundamental issues that have implications for the current pandemic. These discoveries can help policymakers and school administrators design better curricula, alternately allocate resources, and carefully use relevant technological advancements, which, in the end, will lead to desired behaviors across all sectors. The settling factors that contribute to behavioral intentions can be applied to other scenarios, both today and in the future. This provides a rational source of knowledge that, indeed, can guarantee enhanced academic outcomes and profits by improving society's well-being.

In general, this research makes a valuable contribution to the existing body of knowledge on the acceptance of technology and provides useful recommendations for educational institutions and professionals aiming to enhance the efficacy of video conferencing platforms in educational settings, with a specific focus on the COVID-19 pandemic.

## 6. Conclusions

Higher education has undergone a profound transformation due to the COVID-19 pandemic. By examining students' views of synchronous technology and their perceptions of interactivity, this study distinguishes itself from past theoretical foundations. This research study provides methodical and insightful information about how Omani students felt about video-communication-based learning during the pandemic period. Overall, video-communication-based teaching and learning resulted in higher student satisfaction, and teaching quality was more dependent more on the mentor and cognitive and social factors than on technology. Nevertheless, technology is still a crucial tool for instructors' activities. Implementing a blended pediatric course to supplement the delivery of future courses is therefore ideal. This study's findings imply that video communication is enhancing the educational opportunities for students. They also provide insight into the role of social influence, facilitating conditions, hedonic motivation, and habit, which have a positive impact on students' behavioral intention to utilize video communication services as their major learning tool. Also, video communication affected the research participants' openness to participate in virtual courses delivered via video communication systems.

On the other hand, the relationships between gender, age, and how behavioral intentions work in turn to produce the desired impact are also yet to be determined. In contradiction to previous studies suggesting the considerable power of gender and age in shaping people's behavioral intentions, the current study leads to the opposite conclusion: their impact is not at all distinct. This research specified that the variables social impacts, usability convenience, hedonic motivation, and habitual behavioral patterns maintained a significant influence on intention to act for all ages and genders, and the manner of observation did not change much from the typical pattern of the findings. It is, hence, imperative to acknowledge that this study did not clearly establish the direct impact of performance expectancy and effort expectancy on behavioral intention. These effects, mediated by different characteristics such as gender and age, may be moderated. Yet, gender, age, and other demographic factors are factored out as they turned out to have a very low impact on the important integrations that influence behavioral intention, which therefore shows the high reliability and strength of the other factors in influencing the conduct of humans across different categories.

It is suggested that decision-makers and practitioners think about the proposed factors to improve the pedagogical value of video communication services in higher education institutions. To enhance the acceptance of video communication services, higher education institutions should organize informative workshops and seminars to educate students about their potential benefits. It would be helpful for students if university authorities implemented m-learning technology in their institutions. This may change students' intentions regarding positively accepting video communication services. Moreover, designers and developers should develop video communication services in light of the proposed factors. This could increase students' intention to accept video communication services as a learning tool.

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**Informed Consent Statement:** Informed consent was obtained from all participants involved in this study.

**Data Availability Statement:** The data presented in this study are available upon request from the corresponding author.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## Appendix A. Survey on UTAS Student Acceptance and Use of Video Conferencing Tools during Pandemic

This survey is about identifying university student acceptance and use of video conferencing tools during the pandemic at the University of Technology and Applied Sciences (UTAS). Your responses will be used to study student acceptance and use of video conferencing tools. Summarized results will be reported back to participants.

Your participation in this survey is voluntary, and you can stop at any point without your responses being included in the dataset.

Introduction:

Video conferencing is a practical way to have face-to-face meetings with people in different places [32]. The Oxford dictionary describes video conferences as “meetings in which persons from diverse locations communicate via voice and video” [39]. Initially, video conferencing was only utilized to eliminate needless business travel a decade ago, lowering costs on housing and saving time [22]. To create such effective interaction, video conferencing platforms play a vital role in this regard in various areas, e.g., health, conferences, business, etc. [32]. During the COVID-19 lockdown, video conferencing became more and more popular [40]. Video conferencing may be used in classrooms, job interviews, research conferences, and more [32]. This was possible through video conferencing platforms that made this connectivity possible for organizations, institutions, the public, and corporations to satisfy their daily needs [32].

#### *Appendix A.1. Demographic Data*

1. I am (adapted from [91–93])
  - ☐ <18
  - ☐ 18–21
  - ☐ 22–25
  - ☐ 26–29
  - ☐ ≥30
2. I am (from [91–93])
  - ☐ Male
  - ☐ Female
3. Educational level (Undergraduate Student Only) from [91–94])
  - ☐ Year 1
  - ☐ Year 2
  - ☐ Year 3
  - ☐ Year 4
4. Do you use a video conferencing tool? (adapted from [95])
  - ☐ Yes
  - ☐ No
  - (1) How long have you been using a video conferencing tool? (adapted from [95])
    - ☐ Less than a year
    - ☐ A year or more and less than 3 years
    - ☐ Three years or more and less than 5 years
    - ☐ 5 years or more
  - (2) How often do you use a video conferencing tool (adapted from [95])
    - ☐ Daily
    - ☐ Weekly
    - ☐ Once a month
    - ☐ Several times a year
5. Experience using video conferencing tools (adapted from [93,95])
  - ☐ No experience
  - ☐ Some experience—I have tested and tried some basic functionality of video conferencing tools (i.e., Siri)
  - ☐ Experienced—I have tested and used advanced applications and content on video conferencing tools.
  - ☐ Very experienced—I have developed and tested several video conferencing tools.

## Appendix A.2. Acceptance and Use of Video Conferencing Tools

Table A1. Acceptance and use of Video Conferencing Tools Survey.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
Performance Expectancy (adapted from [55])							
PE1. I find video conferencing tools useful in my daily life.							
PE2. Using video conferencing tools increases my chances of achieving things that are important to me.							
PE3. Using video conferencing tools helps me accomplish things more quickly.							
PE4. Using video conferencing tools increases my productivity.							
Effort Expectancy (adapted from [55])							
EE1. Learning how to use video conferencing tools is easy for me.							
EE2. My interaction with video conferencing tools is clear and understandable.							
EE3. I find video conferencing tools easy to use.							
EE4. It is easy for me to become skillful at using video conferencing tools.							
Social Influence (adapted from [55])							
SI1. People who are important to me think that I should use a video conferencing tool.							
SI2. People who influence my behavior think that I should use a video conferencing tool.							
SI3. People whose opinions I value prefer that I use a video conferencing tool							
Facilitating Conditions (adapted from [55])							
FC1. I have the resources necessary to use video conferencing tools							
FC2. I have the knowledge necessary to use a video conferencing tools							
FC3. A video conferencing tool is compatible with other technologies I use.							
FC4. I can get help from others when I have difficulties using video conferencing tools							
Hedonic motivation (adapted from [55])							
HM1. Using a video conferencing tools is fun.							
HM2. Using a video conferencing tools is enjoyable.							

Table A1. Cont.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
HM3. Using a video conferencing tools is very entertaining.							
Price Value (adapted from [55])							
PV1. A video conferencing tools reasonably priced.							
PV2. A video conferencing tools is a good value for the money.							
PV3. At the current price, the video conferencing tools provides a good value.							
Habit (adapted from [55])							
HT1. The use of video conferencing tools has become a habit for me.							
HT2. I am addicted to using video conferencing tools							
HT3. I must use video conferencing tools							
Behavioral intention (adapted from [55])							
BI1. I intend to continue using a video conferencing tools in the future.							
BI2. I will always try to use video conferencing tools in my daily life.							
BI3. I plan to continue to use a video conferencing tools frequently.							
<ol style="list-style-type: none"> <li>1. To what extent do you agree or disagree with the following statement about video conferencing tools during pandemic?</li> <li>2. Please choose your usage frequency for each of the following during the pandemic (adapted from [55])—Scale adapted from [96])</li> </ol>							
	Never	Very Rarely (Once a Month or Less)	Rarely (2–3 Times a Month)	Once a Week	Occasionally (2–3 Times a Week)	Frequently (1–2 Times a Day)	Very Frequently (Several Times a Day)
USE1. Using video conferencing tool to attend Lectures							
USE2. Using video conferencing tool to follow the Labs							
USE3. Using video conferencing tool to sit for Exams							
USE4. Using video conferencing tool along with Blackboard.							



## Appendix B. Confirmatory Factor Analysis (PLS Approach)

**Table A2.** Confirmatory factor analysis (PLS approach).

Construct	Mean	SD	Loadings	p-Value	Confidence Intervals	
					2.5%	97.5%
Performance expectancy (PE)						
PEE1	3.68	1.25	(0.921)	<0.001	0.805	1.037
PEE2	3.42	1.21	(0.929)	<0.001	0.813	1.045
PEE3	3.47	1.19	(0.921)	<0.001	0.805	1.037
PEE4	3.44	1.17	(0.913)	<0.001	0.797	1.029
Effort expectancy (EE)						
EE1 <sup>(a)</sup>	3.86	1.26	N.A.	N.A.	N.A.	N.A.
EE2	3.68	1.20	(0.948)	<0.001	0.832	1.063
EE3 <sup>(a)</sup>	3.90	1.24	N.A.	N.A.	N.A.	N.A.
EE4	3.70	1.22	(0.948)	<0.001	0.832	1.063
Social influence (SI)						
SI1 <sup>(a)</sup>	3.47	1.22	N.A.	N.A.	N.A.	N.A.
SI2	3.40	1.19	(0.968)	<0.001	0.853	1.083
SI3	3.46	1.20	(0.968)	<0.001	0.853	1.083
Facilitating conditions (FC)						
FC1 <sup>(a)</sup>	3.44	1.19	N.A.	N.A.	N.A.	N.A.
FC2	3.62	1.20	(0.943)	<0.001	0.827	1.058
FC3	3.54	1.21	(0.931)	N.A.	0.815	1.046
FC4	3.56	1.25	(0.914)	<0.001	0.798	1.030
Hedonic motivation (HM)						
HM1	3.05	1.42	(0.802)	<0.001	0.683	0.920
HM2	3.39	1.26	(0.802)	<0.001	0.683	0.920
HM3 <sup>(a)</sup>	3.35	1.28	N.A.	N.A.	N.A.	N.A.
Habit (HA)						
HA1	3.55	1.24	(0.935)	<0.001	0.820	1.051
HA2	3.18	1.28	(0.886)	<0.001	0.770	1.003
HA3	3.59	1.20	(0.916)	<0.001	0.800	1.032
Behavioral intention (BI)						
BI1	3.40	1.28	(0.949)	<0.001	0.834	1.065
BI2	3.29	1.27	(0.949)	<0.001	0.834	1.065
BI3 <sup>(a)</sup>	3.36	1.27	N.A.	N.A.	N.A.	N.A.
Use behavior (USE)						
UB1	4.08	1.16	(0.844)	<0.001	0.726	0.961
UB2	3.69	1.23	(0.870)	<0.001	0.753	0.987
UB3	3.67	1.25	(0.881)	<0.001	0.764	0.998
UB4	3.75	1.22	(0.901)	<0.001	0.785	1.017

<sup>(a)</sup> Dropped item due to an outer loading less than 0.50. N.A.—not applicable.

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