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Factors affecting business school students’ performance during the COVID-19 pandemic: A moderated and mediated model

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ABSTRACT

The COVID-19 pandemic has directly influenced higher education by converting traditional face-to-face (F2F) learning to blended learning (BL). Because of this dramatic change in the academic environment, it is essential to evaluate student views and preferences and how the BL setting affects their academic performance. Therefore, the current research aims to investigate the relationship between Unified Theory of Acceptance and Use of Technology (UTAUT) constructs (performance expectancy, effort expectancy, and facilitating condition) and student academic performance through student attitude. We also examined the moderating role of trust in technology between UTAUT constructs and student performance. The study uses a sample of 1050 business management university students for mediation/moderation analysis using the Hayes Bootstrap technique. The results demonstrate that student attitude mediates the relationship between UTAUT constructs and student academic performance, with trust in technology strengthening the relationship. The study offers implications for universities and policymakers.

1. Introduction

Universities are investing in information and communication technology (ICT) to achieve their primary goal, i.e., knowledge exchange. It not only assists students in learning, but it also promotes collaboration between faculty and students. Researchers and instructors all around the globe have also reported improvement in student learning through online education. It provides learning freedom concerning time and space and fosters self-regulation of learning (Chen & Hwang, 2019; Mohammadyari & Singh, 2015). Undoubtedly, the conventional teaching approach has been used to educate students for a long time and is still used today; however, with the advancement of technology and sudden COVID-19 pandemic crises, institutes’ dependability on digital technology has increased (Lapitan Jr et al., 2021).

With COVID-19 widespread, most educational institutes were closed, and students almost worldwide were asked to stay at home, with limited personal visits outside. As a result, 191 countries had nationwide school closures, more than 1.6 billion students were affected, and more than 63 million instructors were impacted globally. But, responding to the call to continue teaching during the 2020 lockdown, the Higher Education commission asked universities to conduct considerable transformations and radically alter teaching activities/processes for lectures and laboratory classes (Ozadowicz, 2020). Later, when the lockdown was removed due to the decrease in cases, parents were still reluctant to have direct interaction (F2F) between teachers and students, and among students. As a result,
institutes re-arranged their processes, developing and deploying strategies to offer courses in a blended form (Nuankaew & Nuankaew, 2021). It was believed BL was a practical and fair alternative for a gradual shift, not only due to its efficiency throughout the pandemic but also for more effective learning (Lapitan Jr et al., 2021).

Blended learning is a method of teaching that educational institutes are increasingly adopting owing to its apparent success. It combines online with traditional F2F learning methods, allowing students to learn quickly, in an ongoing and accessible manner. It combines teaching techniques and resources that can be placed somewhere on a continuum, between fully online and fully face-to-face courses. Although BL is quite popular, well-established, and acceptable among students at Western universities, this may not be the case for developing nations; students from Asia, Africa, and the Middle East suffer digital inequality, lack of infrastructure, and technical support (Prasad et al., 2018). According to Wright (2017), BL in developing countries is at an early stage. The delay in its adoption by the universities is reportedly due to a lack of allotted funds and resources (Abuselim et al., 2020). According to Chowdhury (2019), integrating technology into the education system depends on several conditions, notably: improved infrastructure, stable power supply, strong technical expertise, change in attitudes, and adequate funds for training programs. Hence, insufficient logistic assistance, unwillingness to change old beliefs and mindsets, and lack of technological infrastructure support create hurdles for students’ academic attitude and performance in BL settings (Al-Samarraie & Saeed, 2018).

Before 2003, numerous theories and models were established to investigate user technology acceptance behavior. Still, researchers mainly selected only one of these developed models, paying no consideration to the efforts made by others. Thus, certain essential factors that have previously been ignored must be investigated to evaluate user perceptions of the technology. There was a need for a comprehensive framework that concatenates all necessary variables, such as contextual, psychological, and behavioral factors, to examine technological acceptance and performance. Venkatesh et al. (2003) addressed this issue and merged eight primary models/theories (Technology acceptance model, Innovation Diffusion Theory, the theory of reasoned action, the motivational model, the theory of planned behavior, a model combining the TAM and TPB, the model of PC utilization, and social cognitive theory) of information systems that had previously been extensively utilized and evaluated by researchers in various settings and named it “UTAUT.” All the related constructs were placed together. A key name was given to each: performance expectation, effort expectancy, trust in technology in the context of virtual learning in general and BL settings.

UTAUT has since become a commonly used theory for evaluating user acceptance (Venkatesh et al., 2003) and has received ample empirical support. It has been extensively used to investigate the adoption of numerous technologies in various settings (Williams et al., 2015), such as m-health (Dwivedi et al., 2016), m-wallet (Gupta et al., 2020), e-learning (Abbad, 2021; El-Masri et al., 2017), and BL (Azizi et al., 2020; Bamoallem & Altartee, 2021). Although UTAUT explained significant variance in intention and user behavior, these studies ignored the impact of moderators (Dwivedi et al., 2020). Moreover, it is suggested that researchers consider ways to expand the UTAUT model through different outcome variables that include evaluating the consequences (user performance) of technology usage and behavioral outcomes (Dwivedi et al., 2020; Venkatesh et al., 2016). In 2010, a meta-analysis conducted by the US Department of Education showed that learners in mixed (blended) and exclusively online courses excelled and outperformed as compared to those who had F2F teaching. Francis and Shannon (2013) and Prasad et al. (2018) while addressing the success stories of the BL approach suggested further research be conducted using UTAUT. Although performance expectancy and effort expectancy have been reported as important drivers for e-learning system adoption and usage, students’ perceptions in a BL setting have received less focus (Dwivedi et al., 2020; Padilla-Meléndez et al., 2013). Hence, keeping in view the research mentioned above, the current study aims to investigate the influence of the UTAUT construct on student performance considering the mediating role of attitude and the moderating role of trust.

However, it must be acknowledged that research conducted to investigate factors influencing technology acceptance of virtual environments has some limitations. Some gaps must be filled to understand which elements promote or hinder users’ virtual environments for teaching and learning. Studies have confirmed trust in technology as a crucial factor in establishing a successful relationship. Yet they also revealed a scarcity of literature on users’ trust in technology in the context of virtual learning in general and BL settings in particular (Alhamelah & Alshahrani, 2020; Long & Van Hanh, 2020). To fill this gap, the following research questions are proposed:

- Do UTAUT constructs (performance expectancy, effort expectancy, and facilitating condition) significantly impact student performance?
- Does student attitude mediate the relationship between UTAUT constructs and student performance?
- Does trust in technology moderates the relationship between UTAUT constructs and student attitude?

2. Literature review and hypothesis development

The world of progressed innovation has transformed the global education sector by adopting modified learning approaches (e.g., Information and Communication Technology). During the pandemic (COVID-19), remote learning has led educational institutions to embrace advanced technological tools, thus strengthening academic performance. This section presents a fundamental framework of technology, the Unified Theory of Acceptance and Use of Technology (UTAUT) Model, to evaluate these changes. The theoretical model illustrates the student perception regarding technology use in the context of the COVID-19 pandemic. Indeed, this section presents a comprehensive view of the previous studies by demonstrating the following notions: Student Performance (SP), Performance Expectancy (PE), Effort Expectancy (EP), Facilitating Conditions (PC), Student Attitude (SA), and Trust in Technology (ToT), discussed in the same sequence in the following section.
2.1. Performance expectancy and student performance

The unexpected outbreak of COVID-19 has significantly impacted the global education sector, causing educational institutes to adopt novel teaching methods (i.e., e-learning). During the COVID-19 pandemic, extensive involvement of information technology in education has immensely compelled learning institutes to embrace the latest technological solutions to enhance students’ academic achievement. Performance expectancy refers to an individual’s perception regarding the use of technology. It measures the effect of individuals’ (e.g., students’) expectations concerning their academic performance (Hurley et al., 2020). Student expectation plays an essential role in achieving superior learning performance. In line with the statement, studies show that unfilled student expectations lead students to exhibit lower academic performance (Budur et al., 2019). In contrast, the students high on performance expectancy expect higher grades. Hence, performance expectation plays an integral role in increasing an individual’s expectations, thus leading them to achieve high academic grades (Moreno-Guerrero et al., 2020).

Moreover, performance expectancy influences the students’ learning beliefs, thereby achieving superior academic outcomes. These specific beliefs positively impact the students’ grades while making the technological changes, potentially strengthening their work performance. One study indicates that during the COVID-19 pandemic, performance expectancy compelled students to adopt advanced tools, thus achieving improved academic results (i.e., performance) (Md Yunus et al., 2021).

It is possible that during the COVID-19 pandemic, the major changes to the education system guided greater student accomplishments. In support, one study shows that electronic platforms used during the COVID-19 pandemic gave students an advantage over traditional learning (Pei & Wu, 2019) by improving their academic skillset (Elzainy et al., 2020). Consequently, e-learning technologies used during the pandemic have potentially strengthened the communication channel between students and their instructors, resulting in higher academic performance (Alqahtani & Rajkhan, 2020). Hence, based on the previous literature, the Hypothesis developed is as follows:

**Hypothesis 1.** Performance Expectancy is significantly related to Student Performance.

2.2. Effort expectancy and student performance

Today’s learner expectations concerning e-learning are very different from those of conventional learners. The COVID-19 pandemic has altered the educational needs of the sector, allowing students to learn the latest technologies (e.g., smartphones, laptops). The COVID-19 virtual educational system has led students to study at their ease and according to their own requirements (Radha et al., 2020). The technology adoption in the COVID-19 pandemic allowed for the creation of an interactive medium by providing students access to extensive academic resources such as an online library, tutorials, applications, and courses, thus enhancing their learning experience.

In the circumstances caused by COVID-19, technology had assumed an integral role in facilitating students’ outcomes. Effort expectancy refers to individuals’ willingness to embrace technology (Raza et al., 2021). It assists the students’ learning process by providing them with a user-friendly interface that is easy to understand. To further complicate this notion, one study illustrates that during the unfolding of the COVID-19 pandemic, effort expectancy has been found to enhance student performance, thereby causing them to record superior learning outcomes (Sukendro et al., 2020).

To explain this, research shows that the technical user only becomes satisfied if they find the system effective concerning its usage and functionality (Xu & Du, 2018). In this context, one study indicates that effort expectancy positively influences the students’ academic performance by meeting the students’ level of satisfaction (Ashfaq et al., 2020). Technology ease encourages students to practice the use of new technology, leading to higher academic goals. Hence, the impact of effort expectancy explains that technological tools used by the students should be relevant to preserve the students’ capability, proficiency, and knowledge, thus positively impacting their learning progression (Shim & Jo, 2020).

In particular, during the COVID-19 pandemic, the switching from conventional learning methods to remote learning forced institutes to embrace modernized technical infrastructure. To ensure a continuous learning process during the lockdown, schools initiated the concept of virtual classrooms, making the teachers and students familiar with advanced applications such as Zoom, Google Classroom, and Skype (Maphosa et al., 2020). A recent study reports that 63 out of 64 American universities and 17 out of 21 South African universities have made technological applications (i.e., Zoom, Canvas, Google Classroom) mandatory for online learning (Chaka, 2020). Consistently, the literature shows that during the COVID-19 pandemic, these technological applications have enhanced student performance by assisting students in learning activities (Habes et al., 2019).

In conclusion, the literature suggests that during the COVID-19 pandemic, digital platforms have increased students’ comprehension by accelerating their knowledge progression. Consequently, we have concluded the following Hypothesis based on the previous literature:

**Hypothesis 2.** Effort Expectancy is significantly related to Student Performance.

2.3. Facilitating condition and student performance

The growing relevance of technology during the COVID-19 pandemic increased the importance of e-learning in the education sector. The concept of facilitating condition refers to an individual’s perception of technical support to enable them to use the system. It alludes to the availability of sufficient resources to operate the technology and fundamentally develops an interactive system for assisting the students’ performance.
One study reveals that a lack of assistance and training can prevent students from benefiting from web-based technology (Kamaghe et al., 2020). In particular, another study shows that students preferred virtual teaching over traditional learning due to technological supportability during the COVID-19 pandemic (Robles et al., 2019). This specialized assistance to the individual (i.e., students) improved their performance. Given this statement, the research indicates that during the COVID-19 pandemic, technical support provided by teachers encouraged students to display better academic results (König et al., 2020).

Moreover, the favorable conditions for e-learning allowed institutions to develop an effective network for communicating information between teachers and learners. It provided learners with an effective learning environment, progressing their learning activities. The applied technical support increased the student’s understanding of the operational tool, thereby making the technology easy to use. In contrast, the same study also claims that poor internet infrastructure, technological support, and an unfriendly academic environment negatively influenced the students’ learning process (Zheng et al., 2020). Further explaining this notion, another study states that students usually face difficulty when they do not find adequate support for progressing their online learning activities (Maphosa et al., 2020). However, the technical support provided by the faculty facilitates the provision of necessary infrastructure (i.e., computers, laptops, internet), thus providing easy accessibility to academic resources. In support of this, one study reports that during the COVID-19 pandemic, 60% of students retained more material by using remote learning technologies (Li & Lalani, 2020), hence achieving improved academic outcomes.

Undoubtedly, web connectivity (i.e., internet) has undergone tremendous development during the last few decades. Electronic communications allow students to connect to their devices, thereby enhancing their work performance. During the pandemic, global institutions have embraced the internet as a significant component for driving the technologies associated with e-learning (Gamage et al., 2020). The digital technologies used in the 21st century have assisted learners in accessing rich academic material (Oyediran et al., 2020), thus enabling distance learning to boost students’ academic performance. The remote learning system adopted in the COVID-19 pandemic offered significant benefits to learners by making them adopt sustainable learning technologies (Li & Lalani, 2020), influencing their work performance.

During the COVID-19 pandemic, ICT has drastically changed the learning system by establishing an interactive medium for students, enhancing their academic performance. Students who prefer the virtual platform perform better than when using the conventional way of teaching. One study in Poland showed that the significant changes brought about by the pandemic altered teaching methods. The conditions required to facilitate COVID-19 reduction measures led students to smoothly transition their learning activities from traditional in-class to virtual learning (Ozadowicz, 2020). Another study shows that this successful transition has provided students with favorable learning conditions, thus improving their academic performance (Gelles et al., 2020).

Nonetheless, technology is a vital factor in supporting the student learning process. The COVID-19 outbreak has accelerated the online learning system by providing favorable working conditions to students (Gelles et al., 2020). The successful implementation of an e-learning system largely depends on the students’ positive experiences regarding the learning tools. The need to facilitate the COVID-19 conditions may have ensured the successful implementation of the technologies, thereby enhancing student academic performance (Adnan, 2020). Hence, in the view of previous literature, we have proposed the following Hypothesis:

**Hypothesis 3.** Facilitating Condition is significantly related to Student Performance.

### 2.4. The mediating role of student attitude

According to Fishbein and Ajzen (1977), attitude is defined as an “individual’s positive or negative feelings about performing the target behavior.” In contrast, Venkatesh et al. (2003) referred to it as “an individual’s overall affective reaction to using a system” (Botero et al., 2018). For a long time, in acceptance models (TRA, TPB, TAM), attitude towards using technology has been considered a fundamental construct. Nistor and Heymann (2010) suggested further studies on the importance of user attitude in developing user behavior. Hence, Dwivedi et al. (2019) extended UTAUT and introduced an additional construct—attitude—and reported that using technology is not possible without developing a positive attitude. This notion was also empirically tested by investigating the mediating role of attitude between UTAUT constructs and the outcome variable (Dwivedi et al., 2019).

As reported earlier, performance expectancy, effort expectancy, and facilitating conditions influence students’ beliefs, resulting in higher academic performance while experiencing technological advancements (Md Yunus et al., 2021). Learning management system (LMS) supports students’ learning process by presenting them with a useful, easy-to-understand user interface along with specialized assistance and a favorable environment that allows them to improve their performance and academic results (König et al., 2020; Sukendro et al., 2020). Students who perceive ICT as easy to use, with support available to help them use it, and that it helps improve their understanding and performance, will most likely develop positive attitudes toward the usage of the system, be more satisfied, and perform better (Alshare & Lane, 2011; Morris & Venkatesh, 2000). Brown et al. (2002) stated that attitude is the most important construct that explains users’ positive perception and satisfaction toward technology that leads to better performance. According to Selim (2007), one of the most important aspects in determining student success and performance is positive attitudes toward BL. Zhu et al. (2013) mentioned that student attitude and beliefs for using and adopting BL lead to greater motivation and better performance. Therefore, this study, based on the above arguments, illustrates that the relationship between UTAUT constructs (performance expectancy, effort expectancy, and facilitating condition) and student performance is mediated through student attitude, and the following hypotheses are proposed:

**Hypothesis 4a.** Student attitude significantly mediates the relationship between performance expectancy and student performance.

**Hypothesis 4b.** Student attitude significantly mediates the relationship between effort expectancy and student performance.
Hypothesis 4c. Student attitude significantly mediates the relationship between facilitating conditions and student performance.

2.5. The moderating role of trust in technology

Students using BL systems need to upload their knowledge in the form of assignments. As a result, they are more concerned than previously about the level of security and privacy the system provides. Moreover, while using LMS during BL, students depend on technology to interact with the instructor, making learners rely on trust mechanisms to minimize perceived risk and support their decision to utilize new systems for knowledge seeking (Alalwan et al., 2018). During the COVID-19 pandemic, the emerging technologies have fostered a learning system whereby global institutes have adopted various technological tools, thus accelerating learning activities. These advanced technologies create an exciting learning atmosphere that stimulates the students’ attitude toward the novel learning technologies. A positive student attitude toward ICT makes the individual feel confident about the technology. In such circumstances, trust plays a vital role in strengthening the student perception about technology use.

Trust is considered an important element in defining situations where uncertainty exists (Ba & Pavlou, 2002). Two major types of trust were reported to investigate the role of trust in various technological settings. First, Bhattacheryee (2002), Lee and Turban (2001), and Vance et al. (2008) examined users’ initial trust in an online seller in terms of its effects on users’ decision to purchase. They defined initial trust as the trustor’s perception before any first-hand experience. The second is “knowledge-based trust” (KB-trust), the trust developed through experience or familiarity with the technology, as they might have been using similar digital devices or technology in their everyday routine (like social networking sites, blogs, mobile apps, etc.). Because of the familiarity and better understanding of the circumstance, KB-trust lasts longer (Lewicki & Bunker, 1996). As a result, because the trustor is well acquainted with the technology, they might continue using it irrespective of any “performance lapses or circumstances change” (Thatcher et al., 2010). Although numerous studies have been conducted on trust, there is a scarcity of literature that has addressed KB-trust (Pavlou, 2003; Thatcher et al., 2010). The current study, by referring to the “social-psychological trust” phenomena, considers a knowledge-based trust for reporting student trust in technology in the BL environment.

Studies shows that, during the COVID-19 pandemic, the demand for online education increased in accordance with the individual’s prior confidence in information technology. One study shows that students’ perceptions (i.e., performance expectancy and effort expectancy) are strongly moderated by their trust in technology, thus positively influencing the student’s attitude (Christopoulos & Sprangers, 2021). Moreover, the research indicated that, in the context of the COVID-19 circumstances, student trust to use the technology significantly influenced their intention to adopt e-learning tools (Aguilera-Hermida, 2020). Indeed, performance expectancy, effort expectancy, and facilitating conditions are the prime determinants of student attitude toward technology adoption. Given this, a study exploring student perceptions regarding trust in technological capabilities revealed that approximately 65% of the students had confidence in e-learning tools, with an additional 60% and 61.4% of the respondents showing confidence in e-learning operating systems (Raza et al., 2021). Students’ increasing confidence made them adopt ICT developments, thus influencing their work performance. In explaining this notion, the study suggests that student familiarity with the technology positively affects their attitude, thus leading them to achieve superior learning results (Abdous, 2019). Moreover, during the COVID-19 pandemic, another study showed that students’ high technological expectation influenced their attitude, leading them to adopt the educational facilities more willingly (Bawa aneh, 2021). Fig. 1 presents study theoretical framework. Consequently, this study presents the following hypotheses:

H5a. Trust in technology moderates the relationship between performance expectancy and student attitude.

H5b. Trust in technology moderates the relationship between effort expectancy and student attitude.
H5c. Trust in technology moderates the relationship between facilitating conditions and student attitude.

3. Methods

3.1. Participants and data collection

A recommended Public Platform, “Google INC: Google Docs,” was used to create an online questionnaire to evaluate our research questions. The data collection process comprised almost two academic semesters—i.e., from April to November 2020—and a simple random sampling technique was used. Each author was responsible for collecting data; hence business management students of two public and two private sector universities (technically sound and ICT enabled) located in each country, Romania, China, and Pakistan, were the target population. From each country, approximately 225 students in the last two semesters of the degree program were contacted and requested to participate in the current research. Initially, 300 students were involved in the pilot study to ensure scale validity and reliability.

A three-time lag study was conducted, and temporal segregation two to three weeks was ensured between each lag. This was chosen based on Podsakoff et al.’s (2003) suggestion of a temporal segregated research design to control common method bias, which might occur when all study variables are measured at one time using the same criterion. For this study, respondents were asked about performance expectancy, effort expectancy, facilitating condition, and trust in technology at time period one (TP-1); then students’ attitude at time period two (TP-2); and student performance at time period three (TP-3). To match responses of TP-1, TP-2, and TP-3, students’ email IDs were collected each time they responded, and responses of only those participants who participated at all three times were kept. Students were assured about their responses’ confidentiality, privacy, and anonymity.

At TP-1, 1350 students were contacted to participate, and questions comprising demographic variables, independent variable (performance expectancy, effort expectancy facilitating condition), and moderating variable (trust in technology) were asked. Of these, 1276 responses were received, i.e., a 94% response rate. After twenty days, students who responded at TP-1 were contacted again to respond for mediating variable “student attitude.” Out of the 1276 TP-1 respondents, 1120 students responded for TP-2. For time period 3 (TP-3), after another gap of twenty days, participants who participated at TP-1 and TP-2 were contacted and asked about student performance; and 1067 participants responded. After careful data screening and deletion of incomplete responses, 1050 responses were used to test the proposed Hypothesis, with a total response rate of 77%. Demographic statistics reveal that 616 males and 434 females participated in the study. Of the respondents, 798 were enrolled in an undergraduate degree program, 231 students were enrolled in a graduate degree program, and 21 were enrolled in a doctoral degree (see Table 1).

3.2. Study measures

In Pakistan, English is the official language used in universities and previous studies conducted in Pakistan with students as the respondents have used English surveys (Din, 2020; Shehzadi et al., 2020). Therefore, a questionnaire was designed in English for the current research, and a seven-point Likert scale was used to collect the responses.

Venkatesh et al.’s (2003) four-item scale was used to measure the first three items. For the performance expectancy measurement, sample items include: “Using the system increases my productivity” and “Using the system enables me to accomplish tasks more quickly.” For effort expectancy, sample items include: “My interaction with the system is clear and understandable” and “Learning to operate the system is easy for me.” For facilitating condition, sample items include: “I have the resources necessary to use the system” and “A specific person (or group) is available for assistance with the system.” Trust was measured by adapting a five-item scale developed by Dorobaj et al. (2019). Sample items include “The system is dependable” and “The system protects information related to the student record.”

Then, Venkatesh et al.’s three-item scale was again adopted to measure student attitude, with sample items including: “Using blended learning is a good idea” and “Blended learning makes work more interesting.” Chiu et al.’s (2005) three-item scale was used for student performance measurement, with sample items including: “I am satisfied with my performance” and “My decision to use blended learning was a wise one.”

Table 1
Demographic statistics

| Attributes       | Distribution | Frequency | Percentage |
|------------------|--------------|-----------|------------|
| Gender           | Male         | 616       | 58.6%      |
|                  | Female       | 434       | 41.3%      |
| Program enrolled in | Undergraduate | 798       | 76%        |
|                  | Graduate     | 231       | 22%        |
|                  | Doctoral     | 21        | 2%         |
| Age              | <20          | 747       | 71.1%      |
|                  | 21–30        | 175       | 16.5%      |
|                  | 31–40        | 116       | 11%        |
|                  | 41 and above | 12        | 1.1%       |
4. Results and discussion

4.1. Confirmatory factor analysis

Before applying statistical analysis to confirm the validity and reliability of the data, a data screening procedure was performed, and incomplete responses were removed. Once data was cleaned, measurement model evaluation via confirmatory factor analysis (CFA) was conducted using AMOS. As shown in Table 2, the six-factor full measurement model compared to its one-factor model, and the four-factor model of time 1 variables compared to its one-factor model. Revealed higher fit indices values, confirming discriminant validity of the study variables (See Table 2).

4.2. Means, standard deviations, correlations, validities, and reliabilities for the study variables

Table 3 presents the mean, standard deviation, and correlation between the study variables. The means and standard deviation calculated for the variables are: “performance expectancy” (M = 5.06, S.D = 1.456), “effort expectancy” (M = 5.09, S.D = 1.114), “facilitating condition” (M = 4.87, S.D 1.075), “trust” (M = 4.88, S.D = 1.141), “student attitude” (M = 4.96, S.D = 1.254), and “student performance” (M = 5.04, S.D = 1.147). Performance expectancy is significantly associated with effort expectancy (r = 0.582, p < .05); facilitating condition (r = 0.419, p < .05); trust (r = 0.483, p < .05) student attitude (r = 0.564, p < .05), and student performance (r = 0.472, p < .05). The results also confirm reliability through internal consistency reliability (Cronbach alpha) and composite reliability, and validity through AVE and discriminant validity (values given in diagonal) of the independent variable, moderating variable, mediating variable, and dependent variable; all are within the acceptable range as suggested by Hair et al. (2010).

4.3. Hypothesis testing

Mediation analysis was conducted using the bootstrapping technique suggested by Hayes and Preacher (2013). Model 4 of the Macro process was used to calculate indirect effects. The results illustrated in Table 4 reveal a positive and significant relationship between UTAUT constructs (performance expectancy, effort expectancy, and facilitating condition) and student performance with β = 0.371, p < .01, β = 0.584, p < .05, and β = 0.403, p < .05, respectively. Hence, hypotheses H1, H2, and H3 are statistically proved. The results also reveal that student attitude mediates the relationship between UTAUT constructs (performance expectancy, effort expectancy, and facilitating condition) and student performance, as no opposite sign was found between LLCI and ULCI: 0.127 CI [0.094, 0.163]; 0.120 CI [0.081, 0.161]; 0.145 CI [0.113, 0.179]. Hence, hypotheses H4(a), 4(b), and 4(c) are statistically proved.

Hayes and Preacher’s (2013) Macro Process Model 1 was used to conduct the moderation analysis. The results depicted in Table 5 show that trust moderates the relationship between performance expectancy (β = 0.645, p < 0.000), effort expectancy (β = 0.689, p < 0.000), and facilitating condition (β = 0.434, p < 0.000) and student attitude. A graph was plotted (as shown in Figs. 2–4), which shows that in cases of a high level of trust, the relationship between performance expectancy (β = 0.392, p < 0.000), effort expectancy (β = 0.478, p < 0.000), and facilitating condition (β = 0.237, p < 0.005) and student attitude strengthen. Hence, hypotheses H5(a), 5(b), and 5(c) are supported by these findings.

5. Discussion

The COVID-19 outbreak caused worldwide changes in the education sector. The global emergency served as a turning point for innovative advancement in education. Learning institutes were forced to fully explore the role of BL, potentially leading to the achievement of superior learning outcomes.

The global economy is expected to suffer long-term consequences due to the COVID-19 pandemic. This crisis has directly impacted higher education and student experience by replacing F2F learning with BL in most academic institutions. Because of this abrupt change in the academic environment, it is important to evaluate student perceptions and preferences, record how students perceive technology usage, and identify how it affects their academic performance in the BL environment (Mali & Lim, 2021).

Fundamentally, this study focuses on determining the factors influencing student academic performance by using a UTAUT model. Primarily, the study illustrates the mediating and moderating effect of student attitude and trust in technology (ToT) in affecting the

Table 2
Confirmaotory factor analysis of the measurement models.

| Model                | x2     | CFI  | GFI  | AGFI | NFI  | RAMSEA |
|----------------------|--------|------|------|------|------|--------|
| MO: Six factor model | 1158.159 | .906 | .899 | .853 | .895 | .06    |
| M1: One factor model | 5785.126 | .812 | .701 | .685 | .716 | .09    |

Time 1

| Model                | x2     | CFI  | GFI  | AGFI | NFI  | RAMSEA |
|----------------------|--------|------|------|------|------|--------|
| M2: Four factor model| 297.379 | .967 | .951 | .930 | .959 | .062   |
| M3: One factor model | 545.289 | .693 | .657 | .580 | .656 | .165   |

Note: n = 1050, PE = Performance Expectancy EE = Effort Expectancy, FC = Facilitating Condition, TR = Trust, SA = Student Attitude; SP = Student Performance.

The COVID-19 pandemic caused worldwide changes in the education sector. The global emergency served as a turning point for innovative advancement in education. Learning institutes were forced to fully explore the role of BL, potentially leading to the achievement of superior learning outcomes. The global economy is expected to suffer long-term consequences due to the COVID-19 pandemic. This crisis has directly impacted higher education and student experience by replacing F2F learning with BL in most academic institutions. Because of this abrupt change in the academic environment, it is important to evaluate student perceptions and preferences, record how students perceive technology usage, and identify how it affects their academic performance in the BL environment (Mali & Lim, 2021).

Fundamentally, this study focuses on determining the factors influencing student academic performance by using a UTAUT model. Primarily, the study illustrates the mediating and moderating effect of student attitude and trust in technology (ToT) in affecting the
student learning process. Empirically, the results revealed that the UTAUT construct (i.e., performance expectancy, effort expectancy, and facilitating conditions) influences student attitudes, thus leading to achievement of superior work performance. Indeed, this study section highlights the research findings in contrast to previous studies.

| Table 3 |
| --- |
| Mean, standard deviation, correlation, reliability and validity. |
| | Mean | SD | ICR | CR | AVE | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 Trust | 4.88 | 1.141 | 0.782 | 0.825 | 0.611 | (0.782) |
| 2 Performance Expectancy | 5.06 | 1.456 | 0.878 | 0.873 | 0.697 | 0.483** | (0.835) |
| 3 Effort Expectancy | 5.09 | 1.114 | 0.832 | 0.829 | 0.550 | 0.520** | 0.582** | (0.742) |
| 4 Student Performance | 5.04 | 1.147 | 0.790 | 0.561 | 0.474** | 0.472** | 0.568** | (0.749) |
| 5 Facilitating Condition | 4.87 | 1.075 | 0.798 | 0.568 | 0.430** | 0.419** | 0.498** | 0.379** | (0.753) |
| 6 Student Attitude | 4.96 | 1.254 | 0.740 | 0.540 | 0.474** | 0.472** | 0.568** | 0.462** | 0.364** | (0.735) |

Note n = 1050, SD = Standard deviation; ICR = Internal Consistency reliability (Cronbach’s alpha); CR = Composite Reliability; AVE = average variance extracted; Discriminant validities are presented in diagonal parentheses. *p < .05, **p < .01, ***p < .001.

| Table 4 |
| Mediated regression analysis results. |
| Relationships | Effect | SE | T | p |
| IV → DV |
| 1 PE → SP | 0.371 | 0.021 | 17.344 | 0.000 |
| 2 EE → SP | 0.584 | 0.026 | 22.353 | 0.000 |
| 3 FC → SP | 0.403 | 0.030 | 13.249 | 0.000 |
| IV → Mediator |
| 5 PE → SA | 0.481 | 0.021 | 22.136 | 0.000 |
| 6 EE → SA | 0.634 | 0.028 | 22.080 | 0.000 |
| 7 FC → SA | 0.424 | 0.033 | 12.657 | 0.000 |
| Mediator → DV |
| 8 SA → SP | 0.262 | 0.029 | 9.044 | 0.000 |
| Bootstrap Results for Indirect Effects |
| Effect | SE | LLCI | ULCI |
| Direct Effect (PE, SA, SP) | 0.127 | 0.018 | 0.094 | 0.163 |
| Direct Effect (EE, SA, SP) | 0.120 | 0.020 | 0.081 | 0.161 |
| Direct Effect (FC, SA, SP) | 0.145 | 0.016 | 0.113 | 0.179 |

Note: n = 1050, PE = Performance Expectancy, EE = Effort Expectancy, FC = Facilitating Condition, SA = Student Attitude, SP = Student Performance. Bootstrap Sample Size = 5000. LL = Lower Limit, CI = Confidence Interval, UL = Upper Limit.

| Table 5 |
| Moderated regressions analysis for trust. |
| Sr# | Predictor | B | SE | T | P |
| Trust as a moderator between UTAUT constructs & SA |
| 1 | PE | 0.645 | 0.080 | 8.022 | 0.000 |
| 2 | EE | 0.689 | 0.106 | 6.460 | 0.000 |
| 3 | FC | 0.434 | 0.125 | 3.470 | 0.000 |
| 4 | TR | 0.747 | 0.085 | 8.770 | 0.000 |
| 5 | PE*TR | 0.068 | 0.016 | 4.117 | 0.000 |
| 6 | EE*TR | 0.057 | 0.022 | 2.665 | 0.007 |
| 7 | FC*TR | 0.052 | 0.024 | 2.150 | 0.031 |
| Mod Effect Boot SE LLCI ULCI |
| Trust as a moderator between PE & SA |
| MOD-1 SD (1.47) | 0.235*** | 0.032 | 0.171 | 0.297 |
| MOD M (.00) | 0.313*** | 0.023 | 0.267 | 0.357 |
| MOD +1 SD (1.47) | 0.392*** | 0.027 | 0.336 | 0.444 |
| Trust as a moderator between EE & SA |
| MOD-1 SD (1.11) | 0.340*** | 0.042 | 0.257 | 0.423 |
| MOD M (.00) | 0.406*** | 0.031 | 0.345 | 0.468 |
| MOD +1 SD (1.11) | 0.478*** | 0.037 | 0.399 | 0.546 |
| Trust as a moderator between FC & SA |
| MOD-1 SD (1.07) | 0.116*** | 0.042 | 0.034 | 0.199 |
| MOD M (.00) | 0.177*** | 0.032 | 0.113 | 0.240 |
| MOD +1 SD (1.07) | 0.237*** | 0.043 | 0.151 | 0.322 |

Note: n = 1050, PE = Performance Expectancy, EE = Effort Expectancy, FC = Facilitating Condition, TR = Trust, SA = Student Attitude. LL = Lower Limit, CI = Confidence Interval, UL = Upper Limit. p < .05, **p < .01, ***p < .001.
Previous studies indicated that students’ high-performance expectancy improves their academic grades (Moreno-Guerrero et al., 2020). In line with this, this study’s results reveal a significant positive relationship between performance expectancy and student learning performance. Predominantly, the UTAUT constructs influence the students’ performance. Prior studies have shown that, during the COVID-19 pandemic, effort expectancy has improved students’ performance due to achieving superior learning outcomes (Sukendro et al., 2020). Consistently, positive facilitating conditions have also enhanced learning effectiveness, thus accelerating the student learning process (Gelles et al., 2020). Indeed, we found a direct link between efforts expectancy and facilitating conditions in terms of students’ academic performance. Hence, our research findings are consistent with the previous literature. Therefore, hypotheses H1, H2, and H3 are statically accepted based on the analysis.

Moreover, in line with the UTAUT theory, our study illustrates the mediating effect of users’ attitudes on individuals’ performance. Students’ positive attitude toward ICT accelerates their learning process. The success of the e-learning system during the COVID-19 pandemic has made students radically accept the new technological tools, thus enhancing their work performance (Hadoussa, 2020). The study finding implies that efficient use of information technology alters the student’s attitude, thereby positively influencing their academic performance. Hence, hypotheses 4(a), 4(b), and 4(c) are found to be consistent with the previous research.

Fig. 2. Interaction Effects of Performance Expectancy and trust on Student Attitude.

Fig. 3. Interaction Effects of Effort Expectancy and trust on Student Attitude.

Fig. 4. Interaction Effects of Facilitating Condition and trust on Student Attitude.
The new technological trend has changed the learning culture, assisting students to succeed in online activities. The individuals’ confidence in the technology has altered students’ attitudes, thereby fostering their learning process. Confidence with the new technologies has increased their willingness to adopt advanced technological tools. Therefore, during the COVID-19 circumstances, trust in technology (ToT) influenced student attitudes by significantly affecting the UTAUT construct (Pedrosa et al., 2020). As such, the empirical results support hypotheses 5(a), 5(b), and 5(c).

In conclusion, the relationship between UTAUT constructs and students’ performance in BL was investigated in this research. Students enrolled in business degree programs were requested to participate in the study to examine students’ technological beliefs and supporting conditions regarding their attitudes and performance. The study’s findings suggest a positive relationship between PE, EE, FC, student attitude, and student performance. Moreover, mediation analysis using Hayes MACRO PROCESS suggested that student attitude fully mediates the relationship between PE, EE, FC, and student performance. Furthermore, student trust in technology moderates the relationship between PE, EE, FC, and student attitude. Previous BL research supports the current study results (Azizi et al., 2020; Bamoallem & Altarteer, 2021).

6. Conclusion

During the COVID-19 pandemic, recent technological advancements facilitated e-learning as an essential requirement for accelerating academic activities. The BL system brought numerous advantages for institutions in establishing new technological tools to fulfill students’ learning needs. The blended teaching approaches (i.e., e-learning) have empowered worldwide teaching institutions to accelerate the adoption of new web technologies to facilitate learning activities.

In particular, the COVID-19 pandemic has introduced e-learning systems as a fundamental contribution that fortifies students’ performance; as such, learning institutions have embraced BL to enhance learning activities. As a result, this study is of considerable relevance to the education section, as it focuses on the UTAUT model for improving student learning performance in BL settings. It serves as a significant guide for worldwide institutions, thus diffusing the knowledge beyond geographical boundaries regarding modern advancements (i.e., ICT) in education. Indeed, our research findings record a positive relationship between PE, EP, and FC with student performance. Moreover, our findings also explain that student attitude positively mediates the relationship between the UTAUT constructs and student work performance, highlighting trust in technology as significant in moderating the relationship.

6.1. Study implications

This study considers several global implications of the learning process, ranging from personality to performance, attitudes, and technology. BL policies require fundamental changes and shifts in the assumptions of the traditional instructional model. BL relies on regular meetings with students to adapt the instructional model and improve student outcomes.

The transition from traditional learning to BL requires several different types of resources. At the same time, this transition process is based on a learning-unlearning-re-learning flow that applies to both the teacher and the student. This study builds a student avatar to reflect their attitudes and perceptions regarding BL during the COVID-19 period. This information can assist universities in their approach to institutional management and in building a high-performing education system. At the same time, the implications of the study are complex from the perspective of the typology of the 1050 respondents who are part of different universities in different countries (Romania, China, and Pakistan). The different typologies of students contribute to the consolidation of the proposed solution and to the identification of a universal student avatar. This avatar will be increasingly useful to more universities as they strive to establish management strategies to attract foreign students. The avatar this study establishes reflects a student body that is motivated and can be supported to get involved in the learning process in accordance with their personality. Understanding this avatar of the student who benefits from BL can lead to improved learning outcomes.

This study has also demonstrated the importance of digital literacy for graduates and teachers. Regular investment of resources in digital literacy would contribute to better quality of learning processes. From a theoretical perspective, this study lays the foundations for multidisciplinary research in management, learning, and information technology. Subsequent research should involve students from other university centers, thus strengthening the implications of the results for universities and policy makers. Overall, considerable investment is needed to improve delivery of BL so that the rewards from this mode of learning can be enjoyed.

Credit author statement

Muddassar Sarfraz and Kausar Fiaz Khawaja: Conceptualization, Methodology, Software. Larisa Ivascu.: Data curation, Writing- Original draft preparation. Muddassar Sarfraz: Visualization, Investigation. Larisa Ivascu and Kausar Fiaz Khawaja: Supervision.: Kausar Fiaz Khawaja: Software, Validation.: Muddassar Sarfraz: Writing- Reviewing and Editing.

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