Predictors of blended learning adoption in higher education institutions in Oman: theory of planned behavior

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Abstract

The shift toward electronic learning due to the COVID-19 pandemic has created many opportunities to shape Oman's learning styles. This study explores the factors that affect students' acceptance of blended learning (BL) in higher education institutions in developing countries, focusing on Oman. The study examines the impact of demographic and social factors, attitude, subjective norms, perceived behavioral control, self-efficacy, beliefs, behavioral intention, and actual use of BL among students. The Theory of Planned Behavior (TPB) was used as a theoretical framework to understand the decision-making processes surrounding BL adoption. Hypotheses are formulated and tested using statistical analysis of survey results. The questionnaire was distributed to students from Sultan Qaboos University in Oman. The data collected were analyzed using inferential predictive modeling methods such as multiple regression analysis and Pearson correlation. The findings indicate that students have a positive attitude toward BL and are likely to choose it in the future. The study also reveals that demographic characteristics and various dimensions, such as attitude, subjective norms, perceived behavioral control, self-efficacy, beliefs, behavioral intention, and actual usage, influence students' acceptance and utilization of BL. The results contribute to the existing literature and provide insights into the factors that affect BL adoption in developing countries.

Keywords: Blended learning, Theory of Planned Behavior (TPB), e-Learning, Oman

Introduction

Blended learning (BL), which combines face-to-face instruction with online learning activities (Graham et al., 2013), has evolved as a popular pedagogical strategy in higher education institutions around the world. Combining the benefits of traditional and online learning (Poon, 2014) and with a strong influence on students' awareness of the teaching style and learning background, BL improves learning outcomes, improves student engagement and experience, and overcomes the limits of traditional classroom-based instruction (Edward et al., 2018; Ghazal et al., 2018). It also develops constructive, logical skills, enhances teaching characteristics, and establishes social order (Subramaniam & Muniandy, 2019). Students can become more engaged and excited about the

Hamad *et al. Int J Educ Technol High Educ*   (2024) 21:13

Page 2 of 28

learning process when the focus is shifted from teaching to learning thanks to BL (Ismail et al. 2018), increasing their tenacity and dedication. Integrating the qualities of online and traditional in-class learning can lead to overcoming their shortcomings, resulting in blended learning (Azizan, 2010; Sabah, 2020). For BL to be successful, teachers and students must share responsibility for the learning process (Zhao, 2022).

BL involves combining various delivery strategies, learning philosophies, and instructional paradigms. BL involves the integration efforts of teachers, students and administration (Kaur, 2013). It is accomplished by mixing 30% in-class interaction with 70% IT-facilitated education (Anthony et al., 2019). According to Owston et al., (2019) effective BL delivery should combine 20% of classroom instruction with 80% of high-quality online learning. Previous research has shown positive student attitudes and comprehension towards blended learning, potentially affecting the future of teaching paradigms (Lazar et al., 2020; Sabah, 2020). Researchers Wai and Seng (2015) and Wang et al. (2021) argue that by empowering students with enhanced autonomy over their educational journey, higher education fosters learning through improved control and unrestricted availability of both physical and online course materials.

Consequently, students gain the freedom to access academic resources online conveniently and engage with professors and peers in virtual environments while participating in traditional in-person classroom settings (Salonen et al., 2021). Similarly, Miniaoui and Kaur (2014) elaborated that the BL method promotes students' learning autonomy. The authors claimed that blending face-to-face and online instruction can transform students' academic experience. This is because learners can benefit from participating in a learning community, whether in person or electronically (Bokolo, 2019). Additionally, Lin and Wang (2012) showed BL's lower withdrawal rates increase student satisfaction compared to conventional F2F courses. While blended learning has many advantages, implementing it successfully in higher education institutions in developing nations presents unique difficulties and necessitates careful consideration of several issues.

Many learning theories have been applied and newly introduced to build up a proper base of the technological approach; however, many researchers, such as Han and Wang (2019), Bouilheres et al. (2020), and Felipede et al. (2021) argued that the theory should integrate constructivism, connectionism, cognitivism, humanism, educational technology and other learning theories to build up the proper understanding. Wong et al. (2014) and Zhu et al. (2016) emphasized the need for more investigative research on BL adoption to identify the influencing factors. Moreover, Sabah (2020) explains students' behavioral attitudes, motivations, and barriers to continuing to use BL. Based on this, more research is needed, according to the study's recommendations, to investigate the nature of usage-context factors and document the connections between various motives to fully comprehend how these elements collectively encourage students to use blended learning.

For efficient implementation and adoption of this teaching strategy, it is crucial to comprehend the factors that affect the deployment of blended learning in developing nations. The Theory of Planned Behavior (TPB) offers a useful framework to examine the elements influencing the adoption of blended learning in higher education institutions (Jnr et al., 2020). The TPB created by Ajzen (1991) contends that three major constructs impact behavioral intentions and subsequent conduct: attitudes, subjective

norms, and perceived behavioral control. Subjective norms reflect the perceived social pressure and influence from important others regarding the activity, whereas attitudes refer to people's favorable or negative judgments of a specific behavior. Their perceived behavioural control reflects individuals' perceptions of their capacity to carry out the behavior successfully. BL is commonly used in higher education; however, assessing its effectiveness is challenging since BL's components can be very diverse.

Through the lens of the TPB, the predictors of BL deployment in developing countries may be examined, allowing for a thorough understanding of the decision-making procedures and variables that influence the adoption of this cutting-edge instructional strategy. Gawande (2015) affirmed that Oman is in the early stages of implementing BL. There is uncertainty over how concepts for delivery systems like eLearning and BL are being developed. Therefore, models need to explore actual usage to encourage the adoption of the blended learning concept in Oman. Accordingly, this study aims to contribute to the existing literature by examining the predictors of blended learning deployment in developing countries using the TPB as a theoretical framework. Through an empirical investigation, it seeks to identify the attitudes, subjective norms, and perceived behavioral control factors that influence the decision-making processes surrounding BL adoption in higher education institutions in developing countries.

Study objectives

The study's main objective is to explore the factors that affect students' acceptance of BL in higher education in Oman. To achieve the study's objective, several sub-objectives are set:

1. Explore the impact of demographic and social factors in determining their learning approach.
2. Examine the attitude of the students toward the blended learning approach.
3. Explore the role of subjective norms in students' perception of blended learning.
4. Identify how personal beliefs affect students' acceptance of blended learning.
5. Explore the relationship between students' self-efficacy and their acceptance of blended learning.
6. Explore the relationship between students' behavioral intention and the actual use of blended learning.

Literature review

Blended learning in higher education

Many scholars and practitioners from an educational perspective have recognized and researched the importance of the conducted learning tactics, whether to deliver them through traditional means, as face-to-face classrooms or through digitizing the process through semi-learning conduction of blended learning or whole learning via online, electronic and mobile learning. Numerous studies have focused on how new technologies affect the educational sector, specifically how they alter the traditional face-to-face classroom setting. Being trapped between the inflexibility of traditional learning and the limitation of complete electronic learning, BL was developed as an approach to cover the weakness of traditional, in class and electronic learning (Azizan, 2010; Sabah, 2020),

which creates a shared responsibility for the learning process from both instructors and students (Zhao, 2022). Since blended learning is viewed as the future teaching model, many prior studies showed positive students' intention and understanding of the method (Lazar et al., 2020; Sabah, 2020).

Though the presence of digital learning was recognized many years back, the occurrence of the COVID-19 pandemic has deepened the use of and dependency on technology, especially between 2020 and 2021, when the catastrophe forced all governments around the world toward the closure of schools and colleges to contain the global symptoms of the pandemic (Lerma et al., 2022; UNESCO, 2020; Yang et al., 2022). The realization of integrating digital approaches into the learning and teaching framework was converted and widespread, exceptionally involving both instructors and students as essential learning assets in the educational system (Lerma et al., 2022). Therefore, practicing BL in higher education institutions was extensively adopted, promoting computational thinking abilities and higher-order thinking among students. Thus, those students have been encouraged to participate actively in BL and online courses on a continuing basis even after the announcement of the pandemic solution (Gong et al., 2020; Yang et al., 2022).

A systematic review by Balakrishnan et al. (2021) revealed that only four of the 26 studies were conducted in developing nations, perhaps as a result of unreliable Internet connectivity, a lack of resources, instructors' lack of training in new technologies, interruptions in power supplies, low bandwidth, affordable internet connections, and a lack of trust. Anthony et al. (2022) indicated a rise in BL studies from 2004 to 2020, with 2018 being the highest number of publications due to the increased awareness toward BL, especially in Malaysia, where the initiative and procedures of conducting BL in higher education had been established since 2015. The United States of America, Australia and the United Kingdom followed next. However, Arab countries had minimal BL research interest compared to other contexts, with only two resulting studies conducted in UAE and KSA (Anthony et al., 2022). Moreover, their findings inflated the presence of these studies in higher education institutions by almost 62% compared with other settings. Furthermore, Ashraf et al. (2021), using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, conducted a systematic review of systematic reviews on BL to identify BL trends, gaps, and future directions. The results showed that BL research was mostly conducted in higher education and initially focused on students. Most BL research also comes from developed countries, indicating a gap in research from developing countries. Teachers, students, and institutions frequently face issues related to a lack of ICT infrastructure and expertise.

Despite the bright picture of BL, various challenges popped up, motivating many scholars to search for the best substitutions to overcome these barriers. For instance, Sabah (2020), who identified and evaluated the stimulated factors and barriers that forced students' decisions to continue using BL via the Moodle platform. Conducting a multigroup analysis of three different universities in Palestine, the impact of individual differences, BL system's features, students' perceptions and involvement were the most significant stimulating antecedents toward students' attitudes, while perceived behavioral control and subjective norm were found to be the primary factors toward student decisions to continue using the approach. Similarly, Bamoallem

and Altarteer (2022), focusing on Saudi students, pointed out that the idea of BL is very new in Saudi Arabia, with only a few colleges providing such blended educational programs. As a result, little is currently known about how students now perceive this approach.

According to Keržič et al. (2019), BL should not be seen as a replacement for traditional face-to-face classrooms or online learning environments but rather as an approach that can maximize both benefits. BL can facilitate easier and more efficient interaction between students and teachers, personalized learning experiences, and overcome limitations of time and space (Keržič et al., 2019; Lerma et al., 2022; Zhao, 2022). Anthony et al. (2022) and Poon (2014) have questioned the focus of current literature on whether higher education should adopt BL. Instead, they argue that the discussion should be centred around the practical aspects and strategies for successfully implementing BL. Furthermore, BL has been found to increase students' curiosity, enhance their academic skills, improve social communication, and foster self-reliance (Al-shami et al., 2018; Anthony et al., 2022). Students perceive BL positively, as it facilitates interaction through group discussions, online chats, and chapter reviews, leading to increased engagement and satisfaction (Sabah, 2020). Van Laer and Elen (2017) emphasize the importance of BL in developing learners' self-regulation behavior and boosting their confidence in managing the learning process.

However, several factors hinder the adoption of BL, particularly in Arab countries. One critical factor is the availability and quality of technological infrastructure. Insufficient access to reliable internet connectivity, limited digital devices, and inadequate technical support pose challenges to the effective implementation of BL initiatives (Alqudah et al., 2022). Arab countries need to invest in improving their technological infrastructure to facilitate the widespread adoption of BL. Additionally, Onah et al. (2022) highlight students' difficulty in self-regulation and using learning devices as a major challenge when implementing BL. On the other hand, teachers often struggle with technology competencies, while educational institutions face issues related to the supply of adequate instructional technologies and effective support for teacher preparation (Rasheed et al., 2020).

In Oman, there is currently no effective BL policy in place. However, with the outbreak of the COVID-19 virus in 2020, the Ministry of Education began promoting the concept. Moreover, His Majesty Sultan Haitham al-Tariq of Oman recognized the development and introduction of BL as an effective pedagogy in education in 2020/2021 (Nair, 2020). Al-Musawi et al. (2020) have highlighted several benefits of BL, including time and effort savings, teaching skills development, and teaching practice facilitation. Overall, BL enhances students' knowledge retention. BL has been considered an optimal and novel practice in higher education institutions, with various implementations across primary, middle, and high schools (Keržič et al., 2019; Lazar et al., 2020). However, there is a scarcity of investigative studies on students' perceptions of BL in universities, with most existing studies focusing on the potential benefits and challenges of the approach (Anthony et al., 2022; Joo et al., 2017). As BL continues to evolve, it will be integrated with new technological advances, creating new BL environments that should be assessed based on learners' perceptions (Nadlifatin et al., 2020).

Theory of planned behaviour (TPB)

Various studies have utilized technology acceptance theories to establish the foundation for blended learning (BL) with appropriate infrastructure. Yang et al. (2022) employed the Expectation-Confirmation Model of Information System Continuance (ECM-ISC) integrated with intrinsic motivation and academic self-efficacy as key personal factors. The ECM-ISC model incorporates perceived usefulness, confirmation, satisfaction, and information system continuance intention, which have been supported as effective measures for e-learning continuance intention (Roca & Gagne, 2008; Sorebo et al., 2009). The Theory of Planned Behavior (TPB) has been widely used to explain various learning behaviors and individuals' choices regarding leisure activities, health decisions, and technology adoption. Lerma et al. (2022) integrated TPB with other context-relevant variables to predict e-learning success during the pandemic. In their theoretical review, Anthony et al. (2022) noted that the Technology Acceptance Model (TAM) was the most frequently used theory among their selected studies, accounting for 13% of the cases, followed by the Unified Theory of Acceptance and Use of Technology (UTAUT) with 7% and the Diffusion of Innovations (DoI) with 5% of the studies. Thus, this study contributes to the literature by applying TPB to BL technologies in higher education institutions.

TPB has been employed to investigate various technological learning approaches. For instance, Cheon et al. (2012) explored college students' perceptions and readiness for mobile learning in higher education in the United States, using TPB to demonstrate that students' attitudes, subjective norms, and behavioral control positively influenced their acceptance of mobile learning. Valtonen et al. (2015) also used TPB to investigate pre-service teachers' intentions to use ICT for teaching and learning. The model showed that self-efficacy and subjective norms were the primary factors affecting instructors' adoption behavior. Furthermore, Nyasulu and Chawinga (2019) used the TPB model to examine how the WhatsApp messaging service was used as an e-learning tool in Malawi. Their conclusions showed that quick information sharing, academic collaboration, and the opportunity to learn outside of traditional class times benefited students. They did note several difficulties, though, including the price of mobile devices, frequent power outages, and erratic Internet connectivity from mobile network service providers. In a comparative study, Nadlifatin et al. (2020) compared the behavioral intentions of Taiwanese and Indonesian students toward modern learning technologies using the TAM-TPB model. The model yielded an explanatory power of 41.2% for Taiwanese students and 28.1% for Indonesian students. They recommended further research to address technical and material aspects of BL, such as content, curriculum, and facilities.

Moreover, Azizi et al. (2020) employed UTAUT2 to identify factors influencing students' intention to use BL in Iran, conducting a cross-sectional correlational study with a sample of 225 Iranian medical sciences students. The results revealed that all UTAUT2 factors significantly influenced students' behavioral intentions. Furthermore, Anthony et al. (2022) utilized TPB to evaluate predictors determining students' acceptance of BL in Malaysian higher education institutions.

Predictors of blended learning

While information systems theories and models have played a significant role in explaining technology users' intentions, acceptance, and usage, many scholars and researchers argue for the inclusion of various personal, social, and technical factors to understand the dynamics influencing users comprehensively. Theoretical models used to identify students' behavior towards the simultaneous use of technologies are still in the developmental stage, and the integration of additional constructs is necessary, especially as current empirical research focuses on individual technologies like e-learning and m-learning (Williamson et al., 2020). In the same vein, Hamad et al. (2022) affirmed the importance to investigate behaviors and attitudes of individuals for adopting new trends.

For example, Sabah (2020) proposed a conceptual model based on the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Self-Determination Theory (SDT) of motivation, and other factors. This model integrates critical factors such as individual characteristics, extrinsic and intrinsic motivations, emotional affect, cultural elements, and features of blended learning systems. The study investigated the influential factors that drive students' behavioral attitudes towards adopting and continuously using blended learning systems. The results indicated that students exhibited high levels of self-motivation, self-efficacy, behavioral control, and favorable attitudes toward blended learning.

Bouilheres et al. (2020) identified engagement, flexibility of learning, online learning experience, and self-confidence as factors influencing blended learning adoption in Vietnam. Their findings align with the notion that the university's blended learning environment positively influenced students' perceptions of their educational experiences, as well as their engagement with classmates, professors, and course materials. Anthony et al. (2022) found that attitude, subjective norm, perceived behavioral control, and self-efficacy were predictors of students' acceptance of blended learning in Malaysia. The study also highlighted that students' intention to accept blended learning was significantly influenced by the actual implementation of the approach. This study contributes to the limited body of research investigating students' behavioral intentions toward blended learning deployment in Malaysia and enhances our understanding of the predictors that influence students' intention to accept and adopt blended learning in educational institutions.

Furthermore, in their theoretical and systematic investigation, Anthony et al. (2022) identified several key constructs considered by scholars, such as perceived ease of use, attitude, actual use, self-efficacy, emotional engagement, satisfaction, perceived usefulness, continuance intention, frequency of use, enjoyment, hedonic motivation, habit, age, sex, social influence, and flexibility. Other studies have highlighted factors, such as e-learning adaptability, on-time teacher feedback, outcome expectancy, facilitating conditions, computer self-efficacy, learning atmosphere, perceived enjoyment, system performance, social interaction, content specificity, and performance expectation as important factors influencing learner satisfaction and acceptance of blended learning (García et al., 2014; Wu & Liu, 2013; Yeou, 2016; Zhao & Yuan, 2010).

These studies collectively contribute to understanding the multifaceted factors that shape students' perceptions, attitudes, and intentions toward blended learning.

Blended learning research in Oman

Blended learning has become more prevalent worldwide, including in Oman, where educational institutions are considering using it. Enhancing student involvement is one important benefit of BL in Oman. It provides students with a more dynamic and interactive learning environment by incorporating online components like multimedia and discussion forums. Student retention, student achievement, attendance, satisfaction, and exam performance have all improved at Arab Open University in Oman (Muthuraman, 2018). The learning management system significantly aids in promoting BL, and students have a positive attitude toward it. The study used a six-dimension Hexagonal E-Learning Assessment Model (HELAM) created by Ozkan and Koseler (2009) to determine factors affecting overall university achievement and student satisfaction of BL. Al-Busaidi (2013) instigated the role of Learning Management Systems (LMS) in higher education to promote student adoption of LMS in BL. The study indicates that innovativeness, perceived usefulness, and satisfaction with LMS significantly influence students' intention to engage in full e-learning courses. Al-Ani (2013) investigated the (BL) perspectives of 283 students from different colleges at Sultan Qaboos. The study results offered proof in favor of switching from a traditional learning environment to a mixed learning environment.

According to students, Moodle's online learning platform benefited their motivation, accomplishments, collaboration, and communication skills. Additionally, the results showed that by minimizing the time spent in conventional face-to-face learning environments, BL enabled increased self-regulation and self-direction among students. At Sur College of Applied Sciences (Oman), Gawande (2015) investigated the relationship between behavior intention and user acceptance of technology (BL adoption). It was discovered that elements, including interaction, flexibility, student efficiency, instructor leadership, training, and technical support, influenced BL adoption among students. At Ibra College of Technology (Oman), Siraj and Maskari (2019) find that students favour BL programs. The study emphasized the need for appropriate infrastructure, staff and student training and development programs, and a transition to more targeted practical assessment techniques to gauge graduate qualities. The BL course appeared to positively affect student engagement, learner autonomy, connection of learning to real-world situations, and flexibility. Al Musawi and Ammar (2021) examined the impact of two BL (BL) methodologies compared to conventional approaches within Sultan Qaboos University's College of Education. The experiment set out with the lofty goal of determining the ideal BL ratio that would boost students' academic competence, particularly in comprehension and critical thinking.

Theoretical framework

The TPB considers three types of human actions: behavioural beliefs, normative beliefs, and control beliefs (Ajzen, 1991). The theoretical framework of the current research has been developed based on the research objectives and questions and a review of the related literatures i.e. Yeou (2016); Dakduk et al. (2018), Nadlifatin et al. (2020), Bouilheres et al. (2020), Anthony et al. (2019), Anthony et al. (2022) (Fig. 1).
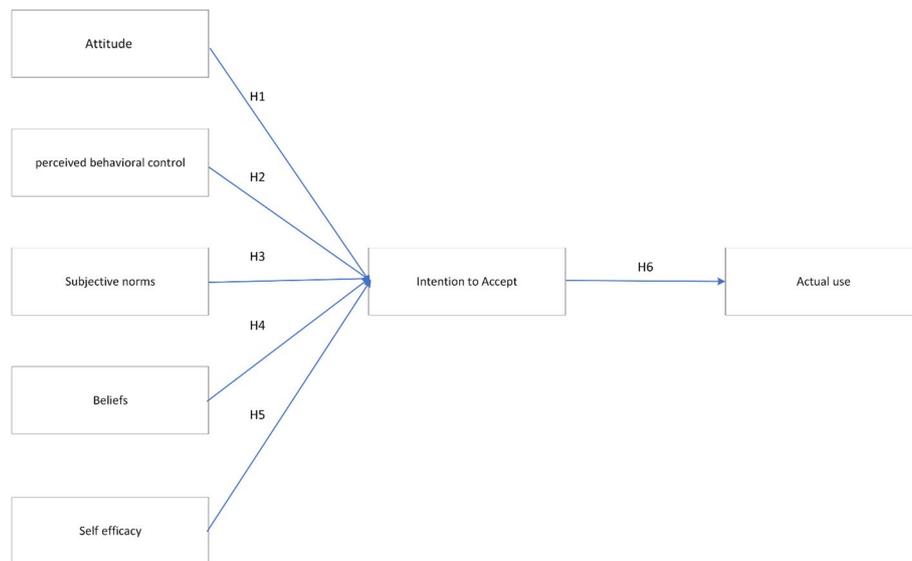
Fig. 1 Shows the research framework, including the independent, mediator, and dependent variables

Hypotheses

Using statistical analysis of survey results and based on the findings of the literature review above, the study expects to provide evidence to the following hypotheses:

Attitude: a measurement of a student's positive or negative opinion of the behavior in question (Ajzen, 1991). As a result, attitude affects students' willingness to accept BL, which affects how BL is used (Valtonen et al., 2022). According to earlier research (Dakduk et al., 2018), student attitudes significantly predicted their intention to accept blended e-learning.

H1: Attitude significantly predicts students' intention to accept BL.

Subjective norm (SN): represents the influence of social pressure or expectations on an individual's intention to engage in a behavior. Previous studies have suggested that SN is associated with students' perceptions of the expectations from others, such as peers, who encourage them to adopt or accept blended learning (Cheon et al., 2012; Dakduk et al., 2018). When students observe their peers endorsing blended learning, they are more likely to embrace it (Dakduk et al., 2018; Valtonen et al., 2022; Yeou, 2016).

H2: Subjective norm significantly predicts students' intention to accept blended learning.

Perceived behavioral control (PBC): reflects an individual's belief in their ability to perform a behavior. PBC is closely linked to an individual's perception of control, subsequently affecting their behavioral intentions and actual usage (Ajzen, 2002; Cheon et al., 2012; Raza et al., 2020). As individuals become more confident in their capability to carry out the behavior in question, their perceived behavioral control increases (Ajzen, 1985).

H3: Perceived behavioral control significantly predicts tudents' intention to accept BL.

Self-efficacy: is related to perceived behavioral control and defined as an individual's belief in their capability to execute a specific behavior successfully (Ajzen, 1991).

Self-efficacy discusses how students use BL and how their level of self-assurance affects their conduct (Tagoe and Abakah, 2014; Yeou, 2016). According to Jnr et al., (2020a), self-efficacy in BL is correlated with how students evaluate student confidence in their abilities to carry out BL activities which positively reflests on their intention to adopt BL (Anthony et al., 2019).

H4: Self-efficacy significantly predicts students' intention to accept BL.

Beliefs: about the outcomes or advantages of performing a behavior.

H5: Beliefs significantly predict students' intention to accept BL.

Intentions: according to Ajzen (1991), intentions determine how motivated individuals are to attempt something new or how much effort they intend to put into engaging in the behavior. According to Revythi and Tselios (2019), the theory of planned behavior is based on the idea that users' intentions drive behavior. Almulla (2022) stated that students' intentions to adopt and use BL are directly impacted by how valuable they believe BL to be.

H6: Students' intention to accept BL positively influences the actual use of BL.

Testing these hypotheses will provide an answer to the research question that supports this study: "What are the main predictors of BL use among university students in the Sultanante of Oman?".

Methodology

This research investigates the factors that affect students' acceptance of BL in higher education in Oman. Sultan Qaboos University students were the population of this study ($N \approx 17{,}000$). Quantitative research methods using a questionnaire were applied based on the research aims and objectives. A convenient sampling technique was used in this study. The questionnaire was distributed to all students from social sciences schools.

Social science students were targeted in 2022 where the number of those students is approximately 6000 students based on the SQU admission office. 362 students were targeted to participate in the survey after calculating the sample size for the total number of both cohorts with 95% confidence level and $+-5\%$ margin of error. The survey was professionally and electronically designed, with well-prepared and simple English language that the targeted students could handle. Moreover, several channels were used to reach these students, including emails, social media and in-class participation by scanning the QR code of the survey URL. However, only 182 returned surveys were obtained from students, resulting in a 50.3% response rate, which is sufficient to rely on their responses. As such, a limitation of this study that could be considered for future research is to have a higher response rate since the current one is limited with improper selected data collection timing. Students were busy with their exams and project submission periods, as well as competing with those students's priorities at that period of time. And this is one of the reasons to exclude scientific schools.

Data collection tool

The data collection method was a questionnaire administered to all social science students during the academic year 2022–2023. The questionnaire facilitates a better outreach and a comprehensive exploration of students' attitudes and perceptions of their BL beliefs. The questionnaire of this research was developed based on the research

objectives and aligned with related literature, such as Yeou (2016), Dakduk et al. (2018), Nadlifatin et al. (2020), Bouilheres et al. (2020), Anthony et al. (2022). The instrument was developed based on the theoretical framework. For example, for Attitude, items measure students' general feelings towards BL, based on Valtonen et al. (2022) and Dakduk et al., 2018). Furthermore, studies show that the endorsement of BL by peers can significantly influence students' decisions toward adopting it (Cheon et al., 2012; Dakduk et al., 2018; Valtonen et al., 2022; Yeou, 2016). PBC captures the individual's belief in their capability to effectively engage in BL (Ajzen, 1985, 2002; Cheon et al., 2012; Raza et al., 2020). SE is correlated with students' assessment of their capacity to perform BL-related activities, impacting their intention to adopt BL (Anthony et al., 2019; Yeou, 2016). Students' perceptions of the outcomes or benefits of engaging in BL and their intention to use it are seen as a key driver of behavior and are influenced by the perceived value of the behavior (Almulla, 2022; Rahman et al., 2019; Revythi & Tselios, 2019).

The questionnaire was emailed to all students from different social science departments, and 182 students responded. The first part of the questionnaire collected students' profiles (sex, academic year level, and technology skills level). Data about students' enrollment in BL courses were also collected to understand the respondent characteristics and variation among the responding groups. The second part of the questionnaire consisted of items (ranked questions).

Sections two to eight of the questionnaire are dedicated to testing the significance level of the given hypothesis of the current study using a 5-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree). Attitude (ATT) is the first independent variable covered by section two questions (6–14). Subjective Norms (SN) is the second independent variable covered by section 3 questions (15–19). Perceived Behavioral Control (PBC), Self-Efficacy (SE) and Belief (B) are also independent variables covered in sections 4, 5 and 6, questions (20–34). Behavioral Intention (BI) is considered the dependent variable of the pre-mentioned variables covered in section 7, questions (35–38). BI is an independent variable for the dependent variable Actual Use (AU), covered in section 8 questions (39–43).

Instrument validity

To ensure validity, the questionnaire was reviewed by a group of referees (N = 6) from information studies, management information systems and education professionals to check for clarity and grammatical errors and to identify the suitability of the questionnaire items to provide answers to the research main questions. Moreover, a Cronbach's Alpha test was conducted to ensure the reliability of the questionnaire. The Cronbach's Alpha value was high, scoring 0.90, as indicated in Table 1.

To ensure validity, the questionnaire was reviewed by a group of referees from the faculty of Educational Sciences and library professionals to check for clarity and grammatical errors and identify the suitability of the questionnaire items to provide answers to the research main questions. For example, one of the recommendations made was to rephrase the item on the competencies form "Designing data infrastructure (metadata creation)" to be "Designing data infrastructure (metadata creation) to enable AI." (item no. 23). Other recommendations were to add items, such as an item on the "chatbots"

Table 1 The result of Cronbach's Alpha test

Variables	Type	No. items	Cronbach Alpha
ATT	Independent Variable	9	0.897
SN	Independent Variable	5	0.873
PBC	Independent Variable	4	0.845
SE	Independent Variable	5	0.821
B	Independent Variable	6	0.901
BI	Dependent Variable	4	0.810
AU	Dependent Variable	5	0.839
Total		7	0.900

Table 2 Participant profile

Variable	Categories	Number	%
Sex	Male	72	39.6
	Female	110	60.4
	Total	182	100.0
Student Academic Year	Foundation Program	4	2.2
	First Year	20	11.0
	Second Year	38	20.9
	Third Year	48	26.4
	Fourth Year	38	20.9
	Fifth Year	34	18.7
	Total	182	100.0
Technological Skills Levels	Beginner	10	5.5
	Intermediary	80	44.0
	Above Intermediary	63	34.6
	Excellent	29	15.9
	Total	182	100.0
Students enrolled in BL courses	Yes	88	48.4
	No	58	31.9
	Maybe	36	19.8
	Total	182	100.0

in library services (item no. 7), another on the capability of using data analytics tools for data mining (item no. 28) and another one about data encryption and security (item no. 31). All reviewer recommendations (N = 12) were considered, and the questionnaire was revised accordingly.

Descriptive statistics of the sample

Descriptive statistics were computed to understand the structure and description of the sample. The distribution of the acquired answers was dominated by female students with 60.4%, compared to the proportion of male students who formed 39.6% of overall targeted participants, as shown in Table 2. Additionally, the layout of the study sample was covered by different academic years. Third-year students in the university topped with 26.4% followed by Second-year students who shared a similar proportion of 20.9% (Table 2). Among these students, most rated their skills in using technology

Table 3 Students' attitudes toward BL courses

	Mean	Std. Deviation
ATT1	3.6374	1.06700
ATT2	3.5824	1.03599
ATT3	3.5495	0.97781
ATT4	3.9725	0.89462
ATT5	3.9725	0.85677
ATT6	3.9945	0.85072
ATT7	3.7747	0.87874
ATT8	3.6044	0.97911
ATT9	3.8352	0.79728
Total	3.769	0.691

Table 4 Students' subjective norms toward BL courses

	Mean	Std. Deviation
SN1	3.5989	1.02919
SN2	3.5659	0.94813
SN3	3.4176	1.01444
SN4	3.2143	0.94793
SN5	3.2857	1.04892
Total	3.416	0.813

as intermediate (44%) and advanced intermediate (34.6%) levels, with 78.6% of overall students, as indicated in Table 2. As a real practice of BL courses, (48.4) of respondents indicated they are enrolled in BL courses (Table 2). 19.8% response (maybe) indicated a lack of understanding of the term BL.

Statistical analysis

Inferential, predictive modelling statistical methods, such as multiple and multiple regression analyses were also applied to test the formulated hypothesis at significance levels ($\alpha = 0.05$) and ($\alpha = 0.01$) to determine the relative correlation between the independent variables and dependent variables. Pearson correlation was used to determine the correlation at significance levels ($\alpha = 0.05$) and ($\alpha = 0.01$).

Results and data analysis

Descriptive statistics of the variables

Attitude (ATT)

Statistically, students' responses indicated a positive attitude toward using BL courses, as displayed in Table 3 with (M = 3.77, SD = 0.691).

Subjective norms (SN)

Students' responses indicated that they are positively affected by their peers' opinion of BL. The results showed that other opinions encouraged students to take these courses with (AVG = 3.42, SD = 0.813) (Table 4).

Perceived behavioral control (PBC)

Regarding students' ability to easily learn using BL, their responses indicated that most of them agreed on their control over behavior of interest, BL, with (AVG = 3.42, SD = 0.914), as displayed in Table 5.

Self-efficacy (SE)

Most of the students believe they are confident about their abilities to enroll in BL courses, as (AVG = 3.58, SD = 0.754) demonstrated in Table 6.

Belief (B)

Based on the opinions collected by respondents, they believe and have confidence in the advantages of delivering BL courses at the university with (AVG = 3.64, SD = 0.815), as shown in Table 7.

Behavioral intention (BI)

Students at the university showed an agreement of their positive intention toward enrolling in BL courses as (AVG = 3.64, SD = 0.807), as shown in Table 8.

Table 5 Students' perceived behavioral control toward BL courses

	Mean	Std. Deviation
PBC1	3.5275	1.21082
PBC2	3.2253	1.20258
PBC3	3.5714	0.97076
PBC4	3.3571	1.06627
Total	3.420	0.914

Table 6 Students' self-efficacy toward BL courses

	Mean	Std. Deviation
SE1	3.7143	0.85767
SE2	3.4121	1.10272
SE3	3.5769	1.01487
SE4	3.3901	1.05982
SE5	3.7967	0.87784
Total	3.578	0.754

Table 7 Students' belief toward BL courses

	Mean	Std. Deviation
B1	3.6593	0.93690
B2	3.8132	0.89086
B3	3.3736	1.18600
B4	3.5989	0.95686
B5	3.5659	1.04249
B6	3.7912	0.93450
Total	3.634	0.815

Table 8 Students' behavioral intention toward BL courses

	Mean	Std. Deviation
BI1	3.7967	0.91482
BI2	3.5769	0.98166
BI3	3.6538	0.99499
BI4	3.5055	1.14065
Total	3.633	0.807

Table 9 Students' actual use of BL courses

	Mean	Std. Deviation
AU1	3.8462	1.02373
AU2	3.5989	0.97968
AU3	3.4066	1.01892
AU4	3.6758	0.95151
AU5	3.5604	0.97151
Total	3.618	0.807

Actual use (AU)

Students who participated in the questionnaire have already enrolled in courses prescribed as BL courses and showed an intention to enrol in similar courses in the future with (AVG = 3.63, SD = 0.807), as shown in Table 9.

Predictive modeling: Independent variable effect on behavioral intention

The P–P Plot in Fig. 2, indicates the goodness-of-fit of the model. It shows that assumptions of regression model is correct and the model's predictions are reliable.

Multiple regression modeling was applied to investigate the prediction power of the independent variable: Attitude, Subjective Norm, Perceived Behavioral Control, Self Efficacy, and Belief on the dependent variable; Behavioral Intention (BI). Based on R-Square value of 0.703 (70.3%), 70.3% of the independent variables of the proposed model can explain BI (Table 10).

As indicated in Table 11, the tolerance values are above 0.2, and variation inflation factor (VIF) values are less than 5 is greater than the usual threshold of 5, meaning no multicollinearity exists in the regression model. When independent variables are correlated, this is referred to as multicollinearity. It may affect the stability and accuracy of the regression coefficients and how the results are to be interpreted.

The Regression equation values in Table 11 indicate that students have more intention to enroll in BL courses as attitude (ATT), subjective norms (SN), self-efficacy (SE), and belief (B) increase. In contrast, the lower their perceived control (PBC) in these courses, the lower their intention to enroll in BL courses. The Regression Equation that demonstrates the predictive power of each independent variable is as the following:
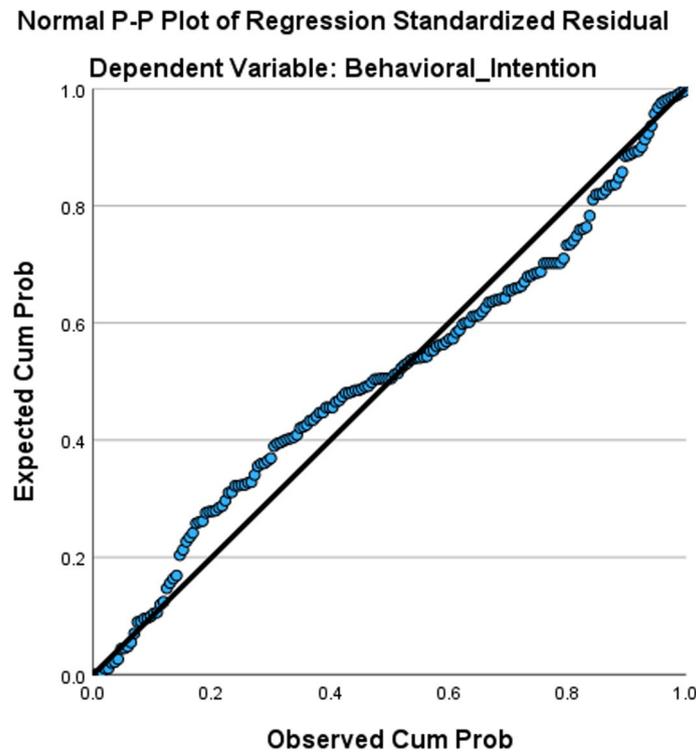
Fig. 2 The P–P Plot for goodness-of-fit of the model

Table 10 Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate	Change statistics				
					R square change	F Change	df1	df2	Sig. F Change
1	0.838[a]	0.703	0.694	0.44641	0.703	83.181	5	176	< 0.001

[a] Predictors: (Constant), Belief, Perceived_Behavioral_Control, Subjective_Norm, Attitude, Self_Efficacy

Dependent Variable: Behavioral_Intention

$$BI = 0.133 + 0.119(ATT) + 0.178(SN) - 0.037(PBC) + 0.323(SE) + 0.390(B)$$

From the Coefficients table (Table 11), and as per the resulting t-values and p-values, Subjective Norms (t-value = 3.101; p-value = 0.002), Self-Efficacy (t-value = 4.431; p-value < 0.001) and Belief (t-value = 5.904 & p-value < 0.001) are the only significant variables and have a positive relationship with belief having the strongest effect. Students' attitude (t-value = 1.542 & p-value = 0.125) and Perceived Behavioral Control (t-value = -0.897 & p-value = 0.371) are not significant and have no influences on Behavioral Intention.

Behavioral intention effect on actual use

The P–P Plot in Fig. 3, indicates the goodness-of-fit of the model. It shows that regression model assumptions are correct and the model's predictions are reliable.

Table 11 Regression's results of coefficients

Model		Unstandardized coefficients		Standardized coefficients	t	Sig	95.0% Confidence interval for B		Collinearity statistics	
		B	Std. error	Beta			Lower bound	Upper bound	Tolerance	VIF
1	(Constant)	0.133	0.196		0.679	0.498	−0.253	0.519		
	Attitude	0.119	0.077	0.102	1.542	0.125	−0.033	0.271	0.389	2.573
	Subjective_Norm	0.178	0.057	0.179	3.101	0.002	0.065	0.291	0.504	1.982
	Perceived_Behavioral_Control	−0.037	0.042	−0.042	−0.897	0.371	−0.120	0.045	0.759	1.317
	Self_Efficacy	0.323	0.073	0.301	4.431	<0.001	0.179	0.466	0.365	2.738
	Belief	0.390	0.066	0.394	5.904	<0.001	0.260	0.520	0.380	2.633

Dependent Variable: Behavioral_Intention

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Actual_Use
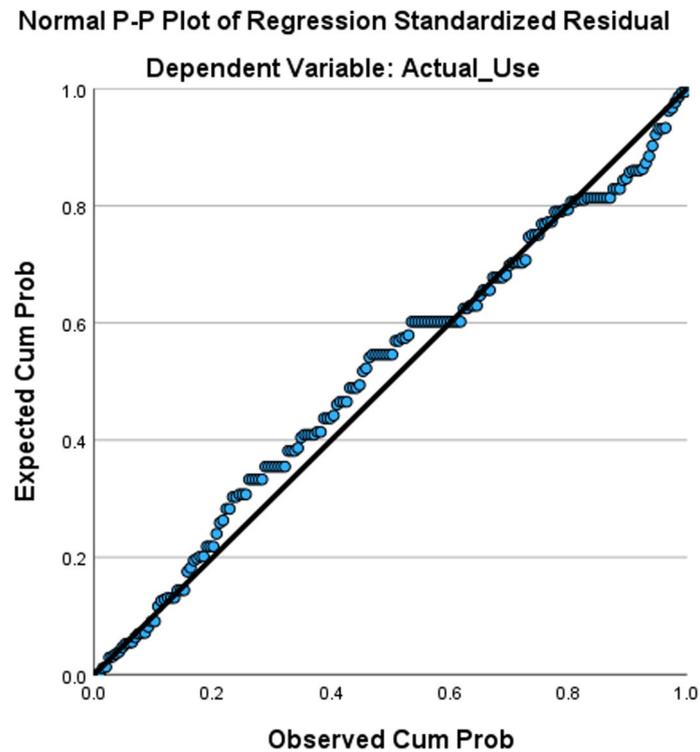
Fig. 3 P–P Plot for the goodness-of-fit of the model

Linear regression modeling was applied to investigate the prediction power of the dependent variable Behavioral Intention–Independent variable or predictor of Actual Use (dependent variable). The regression equation:

$$AU = 1.313 + 0.634(BI)$$

As students' behavioral intention increases, they will engage in more BL courses. This means that students more interested in enrolling in BL courses will enroll in BL courses in the future (Table 12).

Table 12 indicates that the tolerance values are above 0.2 and variation inflation factor (VIF) values are less than 5 is greater than the usual threshold of 5, meaning no multicollinearity exists in the regression model. The results of coefficients (Table 12) and correlation (Table 13), indicate a very strong relationship between the two variables (BI and AU). As per the t-values, which is highly significant ($p < 0.001$), (Table 12), Behavioral Intention (t-value $= 11.893$) significantly predicts student Actual Use. Table 13 further confirms the positive impact of BI on AU.

Based on R-Square value of 0.440 (Table 14). Accordingly, Behavioral Intention significantly explains (44%) of the variance in Actual Use (44% of students' BI can explain their AU). Although the model appears to be reasonably good at forecasting Actual Use, 56% of the variance in Actual Use remains unaccounted for, indicating that additional factors considered by the model may also be impacting Actual Use.

Table 12 Regression's results of coefficients

Model		Unstandardized coefficients		Standardized coefficients	t	Sig	95.0% Confidence interval for B		Collinearity statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.313	0.198		6.615	<0.001	0.921	1.705		
	Behavioral_Intention	0.634	0.053	0.663	11.893	<0.001	0.529	0.740	1.000	1.000

Dependent Variable: Actual_Use

Table 13 Correlation between AU and BI

		Actual_Use	Behavioral_Intention
Pearson Correlation	Actual_Use	1.000	0.663
	Behavioral_Intention	0.663	1.000
Sig. (1-tailed)	Actual_Use		<0.001
	Behavioral_Intention	0.000	
N	Actual_Use	182	182
	Behavioral_Intention	182	182

Table 14 Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate	Change statistic				
					R square change	F Change	df1	df2	Sig. F Change
1	0.663a	0.440	0.437	0.57927	0.440	141.445	1	180	<0.001

a Predictors: (Constant), Behavioral_Intention

Dependent Variable: Actual_Use

Table 15 Final resulted hypothesis testing

Hypothesis	Variables	Results
H1	ATT → BI	Rejected
H2	PBC → BI	Rejected
H3	SN → BI	Accepted
H4	B → BI	Accepted
H5	SE → BI	Accepted
H6	BI → AU	Accepted

Testing hypothesis

Discussion

The study's findings make some intriguing observations regarding how blended learning (BL) is used and accepted by Sultan Qaboos University students in Oman. Using established scales for attitude (ATT), subjective norms (SN), perceived behavioral control (PBC), self-efficacy (SE), belief (B), behavioral intention (BI), and actual usage (AU), the students' responses have been carefully quantified. These dimensions significantly influence the level of acceptance and utilization of BL, which combines traditional and digital approaches, at Sultan Qaboos University.

Students showed a positive attitude toward BL and are likely to choose it in the future because they believe it can help them learn more effectively and freely. Students' desire to adopt BL is influenced by their demographic characteristics. Firstly, the demographics of the sample population reveal a higher proportion of female students and a broad distribution of academic years, with most students having an intermediary to above intermediary level of technological skills. This sex distribution could be related to the specific setting of the study or could also reflect a gender-related trend in attitudes toward blended learning. Similar conclusions have been noted in prior literature. The

sex difference in the sample reflects the trend identified in previous studies, such as Zhang et al. (2020), which found that female students generally show higher acceptance rates for BL. Also, Adams et al. (2021) affirmed that female students are more likely to participate and feel at ease in BL contexts. This suggests that female students may be more adept than male students at time management, taking the initiative to learn new things, and participating in the learning process.

Interestingly, the distribution reveals that almost half of the respondents were already enrolled in BL courses. Third-year students comprised the largest percentage, followed by second and fourth-year students; both came second. The nature of courses might explain this during the early years and some advanced years, where most courses in social sciences are mostly theory and can be easily adapted to BL mode. This information is essential because it gives a general picture of the sample's academic composition and enables an evaluation of how academic standing may affect attitudes toward BL. The majority of students ranked their technological proficiency at intermediate levels, which may indicate that they are at ease using technology and may have an impact on how they feel about BL. The fact that almost half of the students said they were taking BL courses points to the widespread use of BL in this academic environment. The academic year and skill level distribution highlight the significance of these variables in BL acceptance, which is consistent with Al-Azawei et al. (2017) and Alqurashi's (2019) findings.

Nearly half of the students (48.4%) indicated they were enrolled in BL courses, suggesting a significant interest and application of blended learning in this academic setting. This suggests that many students have chosen to enroll in BL courses. There might be several reasons for this: flexibility of learning and personalized learning. BL can also improve the learning environment, which frequently includes interactive digital tools, multimedia resources, and group projects, which can improve the overall learning environment. Several researches supported the explanation provided above. For example, a study by Allen and Seaman (2016) found that flexibility, access to resources, and personalized learning experiences were among the primary factors motivating students to enroll in online or blended courses. Other studies, such as those by Serrano et al. (2019) and Sahni (2019), have also highlighted the benefits of BL courses, including enhanced engagement, improved student outcomes, and increased access to learning opportunities.

On the other hand, the 31.9% who did not enroll in BL courses might have issues related to lack of access to technology, mainly the Internet (Dey & Bandyopadhyay, 2019; Rasheed et al., 2020). It also can be attributed to the limited awareness or understanding of the benefits and opportunities provided by BL courses (Cannon et al., 2023), leading them to choose traditional courses. Also, BL courses may not be available for certain programs or specific courses, limiting the enrollment options for students.

Secondly, analysis of the student's attitudes (ATT), subjective norms (SN), perceived behavioral control (PBC), self-efficacy (SE), belief (B), behavioral intention (BI), and actual use (AU) toward blended learning yielded insightful information. The mean scores of these constructs are all above the neutral point of 3, indicating positive responses toward BL, a finding supported by literature such as Al-Maroof et al. (2021); Anthony et al. (2022). Also, Owston et al., (2019) indicated that students showed positive attitudes toward blended learning due to its flexibility and diverse

learning experiences. A worthy point is the relatively high mean score of the self-efficacy construct, which aligns with Bandura's self-efficacy theory (Bandura & Adams, 1977) argues that the greater one's self-efficacy, the more likely they are to undertake a task or behavior. Similarly, Bandura (1986) argued that self-efficacy plays a crucial role in setting challenges and overcoming obstacles, such as those potentially faced in a blended learning environment.

The inferential predictive modeling analysis explores the relationships between these constructs, particularly how independent variables predict behavioral intention (BI), and, in turn, how BI predicts AU. The R-Square value of 70.3% shows that the independent variables, including ATT, SN, PBC, SE, and B, together can explain 70.3% of the variance in BI towards BL. The regression model revealed that students' subjective norms, self-efficacy, and belief were statistically significant in predicting their behavioral intention toward blended learning, which echoes Venkatesh et al.'s (2003) findings in their UTAUT model. Several previous studies also support this. Numerous studies have found that perceived social norms significantly predict behavioral intention (Brouwer et al., 2009; Rivis & Sheeran, 2003). Ajzen's (1991) theory of planned behavior suggested that subjective norms significantly influence behavioral intentions. People are more likely to engage in a behavior if they perceive that others, such as friends, family, or society, expect them to do so. The statistically significant relationship between subjective norm and behavioral intention in the provided analysis aligns with these findings.

Studies have consistently reported a positive association between self-efficacy and behavioral intention across various domains, including health behaviors, academic performance, and career choices (Bandura & Adams, 1997; Judge & Bono, 2001). Higher levels of self-efficacy are typically associated with stronger intentions to engage in a behavior. The highly statistically significant relationship between self-efficacy and behavioral intention in the provided analysis is consistent with these findings. Beliefs about the outcomes or advantages of performing a behavior have been found to be strong predictors of behavioral intention (Eccles et al., 1998). Positive beliefs about the benefits or advantages associated with a behavior are generally associated with a higher intention to engage in that behavior. The highly statistically significant relationship between belief and behavioral intention in the provided analysis aligns with the existing literature.

Interestingly, the study found that attitude and perceived behavioral control did not significantly influence behavioral intention, contrary to what the theory of planned behavior (Ajzen, 1991) would suggest. The relationship between attitude and behavioral intention has been extensively studied in the field of psychology and behavior change. According to the Theory of Planned Behavior (Ajzen, 1991), attitude is one of the key determinants of behavioral intention. A positive attitude toward a behavior is generally associated with a higher intention to engage in that behavior. However, the lack of statistical significance in the provided analysis suggests that the relationship may be weak or not present in the given sample. Various factors, such as the specific context, deferent level of culture, measurement scales, or sample characteristics might influence this finding. Furthermore, Bervell et al. (2020) argued that sometimes attitude must be investigated in relation to other factors/dimensions, including

technology-related, societal-related, or environmental-related dimensions, to understand or predict BI. Also, the literature has a significant technological character, performance expectancy, and effort expectancy social influence as factors that need further investigation to understand attitude (Davis, 1989; Venkatesh & Bala, 2008; Venkatesh et al., 2003).

Furthermore, research has consistently shown that higher levels of perceived behavioral control are associated with stronger intentions to engage in a behavior (Armitage & Conner, 2004; Sheeran, 2002). However, in the provided analysis, the lack of statistical significance suggests that the relationship between perceived behavioral control and behavioral intention might not be present in the given sample or may be weak. This discrepancy calls for further research to understand the unique contexts and variables that may be at play in this setting.

Based on the results, four out of the six hypotheses (H3, H4 and H5) were accepted, and the remaining three (H1 and H2) were rejected (Table 15). This implies that while subjective norms, beliefs, and self-efficacy significantly predict behavioral intentions toward blended learning, attitudes and perceived behavioral control do not significantly influence this behavioral intention. The Ajzen (1991) theory of planned behavior, which contends that attitudes and perceived behavioral control have a major impact on behavioral intentions, contradicts this result.

The study also discovered that behavioral intention substantially determines whether blended learning courses would actually be used. The technological acceptance model (TAM) (Silva, 2015) contends that behavioral desire to use a technology greatly precedes actual use, and a large portion of the literature concurs with this. According to the linear regression model, the usage of integrated learning in practice and behavioral intention are positively correlated. As a result, students who aspire to employ blended learning are more likely to do so, according to numerous studies (e.g., Silva, 2015; Venkatesh et al., 2003). According to the findings of studies like Ajzen (1991); Venkatesh et al. (2003) and Silva (2015), this evidence is consistent with the notion that Behavioral Intention positively influences Actual Use. Although behavioral intention is a significant component in predicting actual use, the correlation of 0.663 shows that other factors may also be at work, accounting for the share of the variance in actual use that is not explained by behavioral intention. It would take more investigation to determine what these potential influences might be.

In conclusion, the analysis and discussion of the results are robust and shed light on the acceptance and utilization of BL among students in higher education in Oman. The study, however, does hint at unexplained variance in actual use, suggesting that additional factors might influence the actual usage of blended learning that were not captured in the current study. This presents an interesting avenue for future research to explore. Also, attitude and perceived behavioral control were found not to significantly influence behavioral intention, contrary to the TPB, which calls for further investigation to understand other factors that might have a mediation effect on this.

Conclusion

In conclusion, blended learning (BL) has emerged as a popular pedagogical approach in higher education institutions worldwide, combining the benefits of traditional face-to-face instruction with online learning activities. BL has shown to improve learning

outcomes, enhance student engagement and experience, and overcome the limitations of traditional classroom-based instruction. By integrating online and in-class learning qualities, BL can create a transformative academic experience for students, promoting learning autonomy and providing access to a wide range of educational resources.

The Theory of Planned Behavior (TPB) provided a useful framework for understanding the factors that influence the adoption of BL in higher education institutions. Attitudes, subjective norms, and perceived behavioral control play significant roles in students' intention to accept and use BL. Positive attitudes toward BL, social pressure from peers, and a belief in one's ability to engage in BL activities contribute to the intention to adopt and use BL. Additionally, students' self-efficacy and beliefs about the outcomes of using BL also influence their acceptance of this instructional strategy.

The study contributes to the existing literature by providing insights into the factors influencing the adoption and use of BL in developing countries. The findings can inform educational institutions and policymakers in Oman and similar contexts about the importance of considering students' attitudes, social norms, perceived control, self-efficacy, and beliefs when implementing BL initiatives. Understanding these factors can help optimize the design and delivery of BL programs, leading to improved student engagement and learning outcomes.

It is important to note that this study focused on one specific institution and may not be generalizable to all higher education settings. Further research is needed to validate and extend these findings in other developing countries. Additionally, qualitative research methods can be employed better to understand students' experiences and perceptions regarding BL. Moreover, investigating the impact of faculty readiness and support for BL implementation would provide valuable insights into the successful integration of this instructional strategy.

Blended learning has the potential to revolutionize higher education by combining the strengths of traditional and online learning. By considering the factors influencing students' acceptance and use of BL, educational institutions can effectively implement and optimize this approach, leading to enhanced student engagement, improved learning outcomes, and a more flexible and inclusive learning environment.

Abbreviations

AU	Actual use
B	Belief
BI	Behavioral intention
BL	Blended learning
ECM-ISC	Expectation-Confirmation Model of Information System Continuance
HELAM	Hexagonal E-Learning Assessment Model
LMS	Learning Management Systems
PBC	Perceived behavioral control
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SDT	Self-Determination Theory
SE	Self-Efficacy
SN	Subjective norm
TPB	Theory of Planned Behavior
UTAUT	Unified Theory of Acceptance and Use of Technology
TAM	Technology Acceptance Model

Declarations

Ethics approval and consent to participate
This research has been approved by rscientific ommettii at Sultan Qaboos University and is in accordance with rules and regulations in force at Sultan Qaboos University DVC-PSR approval.

Consent for publication
Not applicable.

Competing interests
There is no competing interest.

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