Evaluating the effectiveness of blended learning in learning business courses in low-income economies

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Abstract

Purpose – This paper evaluated the effectiveness of blended learning of business courses in higher learning institutions (HEIs) in developing economies.

Design/methodology/approach – A survey, involving 215 learners, was used to collect data. A stratified sampling technique was used in this study. The data were analyzed using the PROCESS macro in SPSS.

Findings – In the blended learning approach, student attitudes, social presence, IT infrastructure and flexible learning are all favorable predictors of learner satisfaction. The impact of blended learning on learner satisfaction is further mediated by IT infrastructure, social presence and learner attitude.

Practical implications – HEIs need to invest in planning and resource mobilization in order to realize several benefits derived from the use of blended learning. For optimal learning outcomes, this should be combined with training on IT infrastructure usage for both facilitators and learners. In order to assist learners in developing competencies through consistent use, institutions should also invest in tailored blended learning technologies. In addition, emphasis should be placed on training all actors in order to better manage change.

Originality/value – This paper presents and ranks several dimensions for blended learning success in low-budget universities. In addition, the study contributes to the understanding of intervening variables necessary for enhancing the potential of pedagogy in maximizing learner satisfaction.

Keywords Blended learning, Learner satisfaction, IT infrastructure, Learner attitude, Social presence, Leaning flexibility

Paper type Research paper

1. Introduction

Prior to the outbreak of COVID-19, higher education institutions (HEIs) in both developed and developing economies relied more on the face-to-face pedagogical model in which facilitators and learners engaged and interacted (Shaw and Rawlinson, 2022). All learners were accustomed to a face-to-face system of education, with online education being an alternate parallel system (Aisha and Ratra, 2022). The Covid-19 pandemic invigorated the search for digital learning systems (Bordoloi *et al.*, 2021). Over the past decade, there has been a concerted effort to integrate blended learning (BL) into the mainstream of higher education in developed economies. On the contrary, there has been little interest in pushing BL as a method of study in developing economies.

The pandemic, together with its physical protocols, has forced HEI administrators in developing economies, to transition to blended learning with minimal planning and preparation. For many HEIs in developing economies, the focus was to "safeguard teaching

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and learning access for students, as well as just-in-time development training for academic staff in order to complete semesters studies" (Shaw and Rawlinson, 2022, p. 40). The implementation of this phenomenon involved the deployment of a pedagogical model that had not been envisaged as an alternative teaching and learning arrangement. There is no established history of delivering blended learning and hence lessons of best practices to be learned (Aisha and Ratra, 2022). Daniel (2020) mentions that several HEIs have been pressured by governments to adopt and implement virtual learning systems at the expense of traditional learning approaches. As a result, the adoption of blended learning in developing economies is necessary due to factors that are largely independent of the merits of the pedagogy. All HEIs were forced by COVID protocols to immediately switch to an online delivery system. This has happened notwithstanding the resources and skills needed in order to adequately implement the new pedagogy. In addition, there has been no due regard to the impact of the transition on quality (Brenya, 2022). Since then, there has been a rapid adoption and implementation of blended learning with the sole aim of minimizing lost time due to lockdowns (Van Laer and Elen, 2020).

The reasons for adoption and use of blended learning by HEIs in developing economies are in stark contrast to those proffered by HEIs in developed countries. Notwithstanding this, there is uniformity in terms of key components required to effectively implement the blended learning system. Information Technology (IT) infrastructure (Abusalim et al., 2020; Dubey et al., 2023); social presence (Dubey and Sahu, 2021; Quadir et al., 2022); learning flexibility (Wichadee, 2018; Smith and Hill, 2019); and positive learner attitudes are touted as the most influential predictors of effective learning (Namyssova et al., 2019; Bervel and Umar, 2020).

In order to invest in basic IT infrastructure, such as IT support, Wi-Fi connectivity and customized online systems, universities need reasonable budgets. The need for IT support means training users in the use of new infrastructure. Therefore, blended learning has budgetary implications for HEIs, in particular for such infrastructure. It is a challenge for most HEIs in low-income economies with low budgets. In order to effectively implement and use blended learning, a solid information technology (IT) infrastructure is needed to support a chosen blended learning system. In order to support IT investment, there is also a need to support the institutional design and corporate culture. Facilitators and learners should be adequately trained in the use of information technology. In light of these different experiences, this study seeks to evaluate the effectiveness of blended learning pedagogy by HEIs in developing economies in terms of learner satisfaction. Is the use of blended learning reflected in improved learner satisfaction? What is the effect of dimensions that predict blended learning success, on learner satisfaction, in low-income economies?

The aim of this study was to investigate the relationship between the use of blended learning pedagogy and learner outcomes. This study seeks to evaluate the relative contribution of dimensions to blended learning success in low-budget universities, from a learner's perspective. It contributes to an understanding of intervening variables necessary for enhancing the pedagogy's potential to maximize learner satisfaction.

The remainder of this paper is structured as follows: The following section reviews the literature on blended learning. The third section describes the methodology used to collect primary data. The findings are presented in the fourth section. The fifth section discusses the findings. The contributions of the study, its limitations as well as areas for future research are presented in the sixth section.

2. Theoretical framework and hypotheses development
2.1 Definition of blended learning
There are different definitions of blended abound in the literature due in part to the different forms that the pedagogy assumes. This is also partly due to the scope of the discipline as well

as the multiplicity of theories underpinning it. Blended learning encompasses all learning environments supported by various forms of information technology (Muller and Mildenberger, 2021). It is "an approach to education that combines online educational materials and opportunities for interaction with traditional place-based teaching methods" (Rudhumbu, 2022, p. 17). It is a combination of different forms of information technologies that are put together to facilitate and enhance teaching and learning.

Learning could be blended in any four ways. First, it is blended on "time". This relates to the substitution of face-to-face lectures by recorded lectures. The second way is "people". A virtual classroom substitutes a facilitator. Thirdly, blending is by "place". Online group discussions replace physical tutorial groups. The last approach involves using "resources" wherein traditional textbooks and materials give way to online resources. The approach to blending is determined by the nature of the course and discretion of the facilitator (Medina, 2018).

2.2 Benefits of blended learning

The emergence of blended learning is mainly due to the benefits it offers to both facilitators and learners. Its implementation results in a more engaging learning environment that enhances the three types of interactions: learner-to-facilitator (LFIs), learner-to-learner (LLIs), and learner-to-content (LCIs) (Burna and Surabhi, 2020). It has been shown to be more effective than face-to-face or purely e-learning methods (Brenya, 2022). Blended-learning learners evaluated the pedagogy to be more engaging and convenient. On an overall satisfaction scale, learners ranked blended learning as highly satisfying. This method resulted in better grades, higher content knowledge, and an improved understanding of the course content (Burna and Surabhi, 2020). Previous studies have shown that learners prefer blended learning pedagogy to face-to-face learning (Su, 2019; Burna and Surabhi, 2020; Bokolo, 2021; Dubey *et al.*, 2023). On the other hand, students who were exposed to traditional classroom teaching and learning pedagogy noted that it was inconvenient and low in engagement.

The blended learning pedagogy maintains that learners are the focus of teaching and learning. Its tools are flexible, thereby allowing HEIs to adapt teaching activities to changing facilitator and learner demands (Smith and Hill, 2019; Su, 2019). This flexibility makes it possible for learners to plan and pace their learning and decide when and where to study. Blended learning is highly interactive and helps learners get immediate feedback for effective learning. It is a pedagogy that allows facilitators and learners to support their needs and interests. These benefits are rarely reported in situations in which the use of blended learning has been haphazard and forced on institutions (Tshabalala *et al.*, 2014; Su, 2019; Bokolo, 2021; Zimba *et al.*, 2021).

2.3 Conceptual development and hypotheses

2.3.1 Blended learning and learner satisfaction. A number of dimensions have been identified for blended learning success. The first dimension represents information technology (IT) infrastructure. Academic institutions need to invest in IT, IT support, and training of facilitators and learners on how to use such infrastructure (Abusalim *et al.*, 2020; Dubey *et al.*, 2023). The second dimension is the presence of quality interactions in the learning environment (Gunesekera *et al.*, 2019; Quadir *et al.*, 2022). The third dimension linked to learner satisfaction is learner attitudes (Wichadee, 2018; Shu and Gu, 2018). The fourth dimension of learner satisfaction is learning flexibility (Sahni, 2019; Smith and Hill, 2019).

The fifth dimension is the media (Oliver, 2018). Blended learning media represents channels used to transmit instructions to actors in the learning environment. These media should be evaluated for appropriateness because they are not suitable for all types of

learning. The quality of the learning environment is enhanced by some media while others do not (Brenya, 2022). The sixth dimension refers to the need for technical support for both facilitators and learners. Introduction of information technology in learning environments presents a number of challenges, given the level of computer literacy in developing countries. In order to strengthen the introduction of blended learning pedagogy, HEIs need to provide technical support to facilitators and learners. Such a provision should help overcome learners' anxieties. A number of researchers support the need for such institutional technical support for the successful implementation of this approach (Abusalim *et al.*, 2020; Bordoloi *et al.*, 2021; Brenya, 2022; Bokolo *et al.*, 2022; Dubey *et al.*, 2023). Facilitators could then focus on teaching while the learners were absorbed in the actual learning process. The seventh dimension focuses on the rules of the lecture-room and discipline. In order to foster appropriate learner behavior, university administrators need to create rules that help facilitate a productive and enabling learning environment (Brenya, 2022). For the purposes of this study, IT Infrastructure, social presence, learner attitudes and learning flexibility are studied due to their exerting role in influencing the blended learning environment (Quadir *et al.*, 2022; Dubey *et al.*, 2023; Brenya, 2022).

The adoption of blended learning by HEIs has increased significantly over the past decade (Bokolo *et al.*, 2022) due to its transformative potential in education (Aisha and Ratra, 2022). However, some researchers are still debating the effectiveness of blended learning in influencing the teaching and learning environment in developing economies. Blended learning implementation results in effective learning and satisfaction (Dubey *et al.*, 2023). There is improved quality of interactions, and feedback relative to face-to-face learning. As a result, it can be assumed that blended learning could emerge as the pedagogy of choice. The future could lie in blended learning. Therefore, the primary hypothesis is:

H1. Blended learning pedagogy has a positive effect on leaner satisfaction.

2.3.2 IT infrastructure and learner satisfaction. Sun *et al.* (2008) posit that IT infrastructure partly explains the quality of information technology used in learning, along with the quality of internet connectivity. "Apart from quality of technology and Internet, is the perceived ease of use and usefulness of such technology" (Abusalim *et al.*, 2020, p. 1206). Investment in better infrastructure increases learner satisfaction with blended learning. Management should ensure that the technology available to facilitators and learners is easy to use. When learner anxiety is reduced, learner satisfaction increases (Abusalim *et al.*, 2020). Anxiety connected with technological efficacy is seen as a hampering learner satisfaction with blended learning. Therefore, there is a need to improve their efficacy levels, and attitude towards blended learning in order to improve learner satisfaction (Bordoloi *et al.*, 2021).

The technological dimension variable in this study is considered from a social cognitive theory perspective (Bandura, 1977). According to this theory, an employee's confidence to execute certain tasks at work is necessary to elicit successful organizational outcomes. Self-efficacy relates to introspection on the part of a learner to elicit desired behaviors and perform certain tasks.

Computer and blended learning self-efficacy therefore represent a learner's confidence in one's skills and ability to use various forms of information technology tools to accomplish learning tasks. Several studies have found self-efficacy to be a good predictor of learner behavior and blended-learning acceptance (Tarhini *et al.*, 2017; Lin *et al.*, 2018; Bokolo *et al.*, 2022). Notwithstanding the IT infrastructure limitations in developing countries, learners with high levels of computer skills and self-efficacy of online tools are likely to be satisfied with learning in a blended learning environment. Mastery of information technology in the education field should influence learner attitude towards blended learning. Higher levels of computer self-efficacy and internet connection result in greater acceptance of blended-learning (Birbal *et al.*, 2018). Empirical findings show that lack of technological and computer

skills are some of the challenges limiting the implementation of blended learning in developing economies (Tshabalala *et al.*, 2014; Smith and Hill, 2019; Brenya, 2022). Hence, this study's second hypothesis is:

H2. IT Infrastructure has a positive effect on learner satisfaction.

2.3.3 Social presence and learner satisfaction. Social presence is the "degree to which attendees are recognized as being real when interacting online" (Abdellateef and Foroudi, 2022, p. 205). According to the Community of Inquiry framework, social presence refers to the extent to which an actor in a learning environment is an active participant, to a level where they are as good as present and real. Empirical findings reiterate that the three forms of interactions, more than other variables, explain learner satisfaction in any type of learning environment (Gunesekera *et al.*, 2019; Aisha and Ratra, 2022). As learners relate freely to other actors in the learning environment, their level of satisfaction increases. Dubey *et al.* (2023) state that learner-learner and learner-facilitator interactions are drivers of learner satisfaction because of their influence on the learning environment. Interactions also have the added benefit of enhancing the skills of learners. Learning satisfaction is a function of a number of variables. These variables range from learner characteristics, IT infrastructure, and several types of interactions and content (Gunesekera *et al.*, 2019).

Two theories are used to explain the effect of social presence on learner satisfaction: social integration theory and interaction equivalency theorem. The social integration theory postulates that a sense of belonging in learners has a positive effect on their learning environment, mainly through their active participation in online learning activities (Nyathi and Sibanda, 2022). The interaction equivalency theorem postulates that high levels of any of the three forms of interaction guarantee effective learning. A study by Nyathi and Sibanda (2022) however argues that these forms of interactions are not substitutable for enhanced social presence.

Blended learning fosters even higher levels of interaction between all actors in a learning environment (Namyssova *et al.*, 2019; Bokolo *et al.*, 2022). This relative advantage emanates from the pedagogy's ability to allow learners to customize their learning experiences according to their strengths. Consequently, learners find satisfaction in blended learning as the approach takes into account their learning history with e-learning formats, learning styles, beliefs and demographics (Medina, 2018). When courses are designed in a manner that is suitable for blended learning, high levels of academic performance are also guaranteed (Almasi *et al.* (2018). The third hypothesis is therefore:

H3. High social presence interactions have a positive effect on learner satisfaction.

2.3.4 Learner attitudes and learner satisfaction. According to the theory of reasoned action (TRA), there is a causal relationship between attitudes and behavior. Employee behavior depends on beliefs, attitudes, and intentions. A learner's intention to behave in a particular way (behavior intention) depends on a learner's belief that performing that behavior will lead to certain consequences. Positive attitudes toward blended learning were found to be a significant factor in learner satisfaction (Medina, 2018; Dubey *et al.*, 2023). Students with positive attitudes were high achievers and considered blended learning to be engaging and convenient. The fourth hypothesis is:

H4. Learner attitudes have a positive effect on leaner satisfaction.

2.3.5 Learning flexibility and learner satisfaction. According to Ho (2017), facilitators adopt blended learning as a teaching pedagogy to increase flexibility in access to course resources. Smith and Hill (2019) identified learning flexibility among several predictors of learner satisfaction. Learners are given discretion as to what, when, where and with whom to study. Therefore, they become semi-independent actors in the learning process (Birbal *et al.*, 2018;

Sahni, 2019; Brenya, 2022). Part-time students in particular, value the flexibility of blended learning as they have less time to dedicate to the protocols of full-time learning (Su, 2019). The fifth hypothesis is therefore:

H5. Learning flexibility has a positive effect on learner satisfaction.

2.4 Operational definitions

(1) Learner satisfaction

Learner satisfaction is the feeling of accomplishment and success from which learners get learning experiences (Tawfik *et al.*, 2018). It is a positive outcome from satisfactory learning (Mtebe and Raphael, 2018). The phenomenon encapsulates all learning activities such as getting notes, getting assignments notices from facilitators, submissions, marking, and feedback (Bordoloi *et al.*, 2021; Bokolo *et al.*, 2022).

(2) IT Infrastructure

The IT infrastructure refers to the quality of information technology and the Internet (Sun *et al.*, 2008) "Apart from quality of technology and Internet, it is the perceived ease of use and usefulness of such technology" (Abusalim *et al.*, 2020, p. 1206). Examples include Wi-Fi quality, simplified customized e-learning platforms, IT training and support, and the provision of quality computer hardware and software.

(3) Social presence

Social presence represents the "individual perception that his/her presence with a group of people is recognized, valued and respected, which boost the feeling of connected to other group members" (Al-Dheleai *et al.*, 2020, p. 14). It is about being able to interact with all actors in the virtual learning environment as if one was physically present (Quadir *et al.*, 2022). It is a pointer to course satisfaction. Social presence consists of all the three forms of interactions, namely, LFIs, LCIs, and LLIs (Gunesekera *et al.*, 2019).

(4) Learner attitudes

Learner attitudes refer to the learner's readiness to use blended learning (Adams *et al.*, 2020; Dubey *et al.*, 2023). Several dimensions are cited in the literature as influencing learners' attitude and readiness to adopt and use blended learning: perceived ease of use, usefulness of learning technology, promotion of freedom, and responsibility in learning (Adams *et al.*, 2020).

(5) Learning flexibility

Learning flexibility refers to a pedagogy that meets the diverse needs of learners, allowing them to be more responsible for the learning process (Apandi and Raman, 2020; Muller and Mildenberger, 2021). It prompts facilitators to use a variety of learning media, as well as allow learners to choose the timing, pace, and schedule of study with the use of new technologies.

3. Method

3.1 Conceptual framework of the study

Blended Learning Assessment (BLA) framework and Astin's Input Environment and Output (IEO) model are frequently utilized frameworks for evaluating learner satisfaction in the blended learning literature. The BLA framework is more applicable in studies that focus on the adoption of blended learning than on learner satisfaction. This study adopts Astin's Input–Environment–Output model (1993) framework. The model is premised on the joint evaluation of learner inputs, learning environment, and learner outcomes (see Figure 1). This

| Input | Learning Environment | Output |
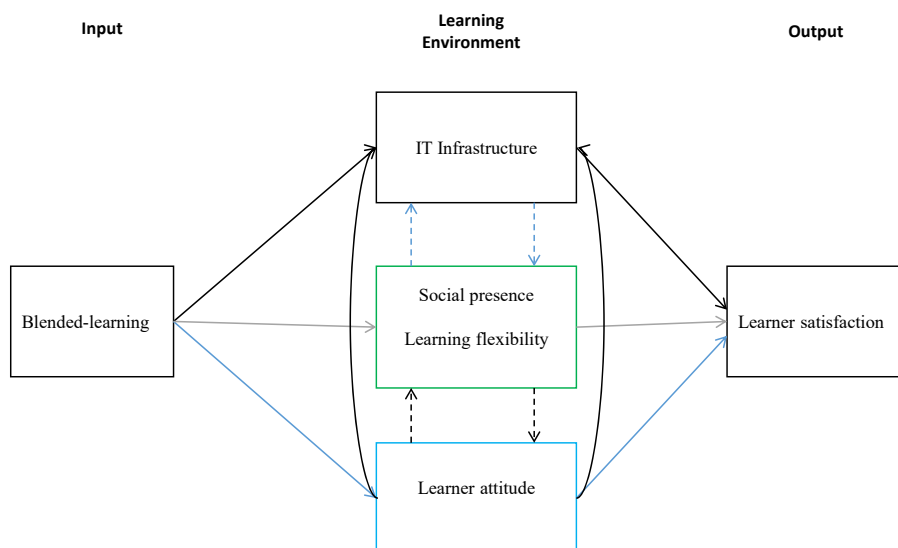
Source(s): Figure by author

study focuses on blended learning's effect on learner satisfaction through enabling factors. Several studies have ignored the indirect effect of the learning environment, choosing instead to focus on the direct effect of blended learning pedagogy on learner satisfaction (Ng, 2017; Dubey and Sahu, 2021; Bordoloi *et al.*, 2021; Aisha and Ratra, 2022). In addition, the effectiveness of blended learning in low-budget universities is still limited.

3.2 Research design

The study examined one institution of higher learning in Zimbabwe. Cross-sectional survey research was used for data collection. The population was made up of all full-time undergraduate students in the Faculty of Commerce ($N = 479$). The choice of the Faculty of Commerce was motivated by the challenges being faced by its facilitators and learners in implementing blended learning. The biggest challenges relate to the high student – low teacher ratio, lack of IT infrastructure, and low mastery of digital knowledge.

For the purposes of sampling the population, an inclusion criterion was that, learners should have been under a blended learning system for at least two academic semesters. Three hundred learners (from Part II, III, and IV) constituted the sample of interest ($n = 300$). The Departmental registers were utilized as sampling frames. Adam's *et al.* (2020) table for determining the sample size from a given population was used.

A stratified sampling method was used. Data were collected through a structured questionnaire. Likert-type scales anchored with "strongly agree" and "strongly disagree" were used. The instrument was administered online as a result of the COVID 19 protocols. Two hundred and fifteen (215) responses were received, representing a 72% return rate.

3.3 Measures

3.3.1 I.T. Infrastructure scale. The seven-item scale was developed by Wichadee (2018), and Abusalim *et al.* (2020). The instrument makes use of a 5-point Likert scale. It was treated as an independent variable in this study.

AAOUJ

3.3.2 Social presence scale. The instrument consists of four items. It makes use of the 5-point Likert scale. It was developed from a validated research instrument used by Wichadee (2018). The variable is treated as a mediating variable in this study (Dubey and Sahu, 2021; Nyathi and Sibanda, 2022).

3.3.3 Learner attitude scale. This scale is a three-item instrument that makes use of the 5-point Likert scale. The learners' attitude scale was developed by Wichadee (2018) and Bokolo (2021). The variable is treated as a mediating variable in this study.

3.3.4 Learning flexibility. A three-item research instrument, developed by Lin *et al.* (2018) and Wichadee (2018) was used in this study. It uses a 5-point Likert scale. The variable is treated as a mediating variable in this study.

3.3.5 Learner satisfaction scale. A five-item instrument, developed by Wichadee (2018) and Nyathi and Sibanda (2022) was used to measure learner satisfaction. It makes use of the 5-point Likert scale. This variable is treated as a dependent variable. Learner satisfaction measures the effectiveness of learner satisfaction.

3.4 Scale validation
A scale validation process identified and evaluated the manifest variables for the six constructs. Reliability and validity tests were carried out to validate the measurement models.

3.4.1 Reliability measures. Table 1 shows the validity and reliability statistics for the scales. The Cronbach's alpha coefficient was used to estimate the internal consistency or reliability of items in a questionnaire. The statistics for the six constructs were: IT infrastructure (0.80), social presence (0.77), learner attitudes (0.74), learning flexibility (0.75), learner satisfaction (0.76), and blended learning (0.83). All the coefficient values are higher than the recommended value of 0.70, (Cohen *et al.*, 2017). All the factor loadings are higher than the recommended value of 0.50 (Cohen *et al.*, 2017). The CR values ranged from 0.77 to 0.91. These values exceed the recommended statistic of 0.70. These statistics confirm the reliability of these measures.

3.4.2 Validity measures. Convergent validity confirms that any two related variables are actually related. AVE provides a reasonable measure of convergent validity. The values of AVE exceed the recommended value of 0.5 (AVE $\geq$0.5) (Cohen *et al.*, 2017). This confirms that all the scales used in this study are convergent valid. Discriminant validity confirms that any two tests that are predicted to be unrelated are indeed not related. For a scale to be discriminant valid (Cohen *et al.*, 2017), the square root of AVE values (discriminant values) should be greater than any correlation between any pair of latent constructs. The discriminant validity values ranged from 0.73 to 0.85. This is higher than any correlation between any pair of latent constructs (Cohen *et al.*, 2017). The validity of the measurement model is confirmed (see Table 1).

3.5 Data analysis
The PROCESS macro in SPSS analysis was used to test research hypotheses and clarify if IT infrastructure, social presence, learner attitudes, and learner flexibility are intervening variables. This analysis is a suitable choice for testing the mediating effects of "intervening" variables.

4. Findings
4.1 Demographic profile of respondents
Fifty-two comma five percent (52.5%) of the respondents were female and 47.5% male. Forty percent (40%) of respondents were in the 20–21 years, age group. Sixty percent (60%) of the

Construct	Items	Item loading	α ≥ 0.70	CR ≥ 0.70	AVE≥0.50	DV
Blended-learning	The blended-learning system is reliable	0.85	0.83	0.81	0.56	0.75
	The e-platform is suited to blended-learning	0.74				
	I am satisfied with the flexibility of blended-learning system	0.71				
	I am satisfied with the speed of blended-learning system	0.69				
IT Infrastructure	I am motivated in learning new information, online	0.75	0.80	0.91	0.73	0.85
	I can integrate information that comes from different online sources	0.91				
	I know how and where to search for useful information online	0.92				
	I have the skills to use digital technology such as computer, smartphone, tablet, effectively	0.82				
	The Internet and computer labs are reliable and accessible on campus	0.79				
	I can fulfill my blended learning tasks with my Internet access from home	0.75				
	My facilitator understands blended learning by making learning more student centered	0.71				
Social presence	Interaction is adequately maintained with the facilitator both in face-to-face and in online sessions	0.87	0.77	0.89	0.66	0.81
	I am satisfied with the way I interact with other students	0.79				
	I am satisfied with the process of collaboration in groups to complete the given tasks	0.92				
	Blended learning allows facilitators to give different types of assessments	0.65				
Learner attitudes	Blended learning encourages students to have responsibility in learning	0.94	0.74	0.87	0.70	0.84
	Blended learning promotes freedom in learning	0.92				
	Blended learning helps improve language skills	0.61				
Learning flexibility	Blended learning provides unlimited access to learning material	0.79	0.75	0.77	0.53	0.73
	Learners chose own timing about when to study	0.67				
	Blended learning is at one's own pace	0.71				

(continued)

Table 1.
Questionnaire items and measurements

Construct	Items	Item loading	$\alpha \geq 0.70$	$CR \geq 0.70$	$AVE \geq 0.50$	DV
Learner satisfaction	I participate more due to blended learning	0.68	0.76	0.89	0.62	0.79
	The blended learning system improves my ability to integrate information	0.92				
	I value the flexibility that comes with blended learning systems	0.88				
	Using blended learning system has increased my performance	0.68				
	Blended learning systems allow me to accomplish learning tasks	0.75				

Table 1.

Source(s): Author's own creation/work

respondents were 22 years and above. Fifty-seven percent (57%) were in Part II, fifteen percent (15%) in Part III, and 28% in Part IV.

4.2 Hypothesis testing

H1. Blended learning pedagogy has a positive effect on leaner satisfaction.

The coefficient of blended learning on learner satisfaction is positive and statistically significant ($\beta = 0.1205$, $p < 0.01$). An increase in the use of blended learning results in an increase in learner satisfaction. The overall model quality is good, explaining 39% (0.387) of the variance in leaner satisfaction (see Table 2).

H2. IT Infrastructure has a positive effect on learner satisfaction.

The effect of IT Infrastructure on learner satisfaction is strong, positive and statistically significant ($\beta = 0.6600$, $p \leq 0.01$). The indirect effect of blended learning on learner satisfaction (see Table 2) is positive and statistically significant ($\beta = 0.1658$,

Path	Coeff	p	LLCI	ULCI	Decision
BL → learner satisfaction r-sq = 0.387	0.1205	0.01	0.0184	0.2021	Supported
IT infrastructure → learner satisfaction r-sq = 0.435	0.660	0.01	0.583	0.796	Supported
Social presence → learner satisfaction r-sq = 0.322	0.568	0.01	0.404	0.609	Supported
Learner attitude → learner satisfaction r-sq = 0.276	0.491	0.01	0.488	0.795	Supported
Lear. flexibility → learner satisfaction r-sq = 0.0241	0.420	0.01	0.218	0.397	Supported

Note(s): Indirect effect(s) of blended-learning on learner satisfaction

	Effect	BootSE	BootLLCI	BootULCI
Total	0.3243	0.0437	0.2334	0.4029
IT infrastructure	0.1658	0.0391	0.0977	0.2502
Social presence	0.1259	0.0430	0.0455	0.2133
Learner attitudes	0.0230	0.0122	0.0034	0.0497
Learning flexibility	0.0131	0.0102	−0.0039	0.0362

Table 2.
Path coefficient and hypothesis testing

Source(s): Author's own creation/work

BootSE = 0.0391). The confidence interval, (0.0977–0.2502), does not span zero (0). The model identifies mediation linked to the IT infrastructure. This model shows good overall quality, explaining 44% (0.4350) of the variance in leaner satisfaction.

H3. Social presence has a positive effect on learner satisfaction.

The effect of social presence on learner satisfaction is strong, positive and statistically significant ($\beta = 0.5680$, $p \leq 0.01$). The indirect effect of blended learning on learner satisfaction (see Table 2) is positive and statistically significant ($\beta = 0.1259$, BootSE = 0.0430). The confidence interval, (0.0455–0.2133), does not span zero (0). The model identifies mediation linked to social presence. This model indicates good overall quality, explaining 32% (0.3220) of the variance in leaner satisfaction.

H4. Learner attitudes have a positive effect on leaner satisfaction.

The effect of learner attitudes on learner satisfaction is strong, positive and statistically significant ($\beta = 0.491$, $p \leq 0.01$). The indirect effect of blended learning on learner satisfaction (see Table 2) is positive and statistically significant ($\beta = 0.0230$, BootSE = 0.0122). Zero falls outside of the confidence interval (0.0034–0.0497). The model identifies mediation linked to learner attitude. This model indicates good overall quality, explaining 0.2760 (28%) of the variance in leaner satisfaction.

H5. Learning flexibility has a positive effect on learner satisfaction.

The effect of learning flexibility on learner satisfaction is strong, positive and statistically significant ($\beta = 0.420$, $p \leq 0.01$). The indirect effect of blended learning on learner satisfaction (see Table 2) is positive, but statistically insignificant ($\beta = 0.0131$, BootSE = 0.0102). Zero falls within the confidence interval ($-0.0039 - 0.0362$). This model is insignificant, explaining only 2% (0.0241) of the variance in leaner satisfaction.

5. Discussion

H1. Blended learning pedagogy has a positive effect on leaner satisfaction.

Blended learning had a positive and significant effect on learner satisfaction. Hypothesis 1 is supported. A number of studies validate this finding, though in situations where there has been sound investment in time and resources for IT infrastructure (Medina, 2018; Bokolo, 2021; Dubey *et al.*, 2023). This positive effect has been replicated too, in low-income conditions (Tshabalala *et al.*, 2014; Abusalim *et al.*, 2020; Bokolo *et al.*, 2022). This relationship, therefore, ignores the planning and resource constraints faced by HEIs in developing countries.

H2. IT Infrastructure has a positive effect on learner satisfaction.

IT infrastructure has a positive and significant effect on learner satisfaction. Hypothesis 2 is supported. Of the four dimensions necessary for learner satisfaction, an improvement in IT infrastructure has the largest effect on learner satisfaction. This finding finds support in a number of studies (Tshabalala *et al.*, 2014; Tarhini *et al.*, 2017; Lin *et al.*, 2018). Improvement in IT infrastructure increases the utilization of blended learning features by learners. The students' capacity to cope with technical difficulties and adequate skills in computer operations and internet searching abilities improved. This is indicative of learners' success.

H3. Social presence interactions have a positive effect on learner satisfaction.

The effect of social presence on learner satisfaction is positive and significant. This predictor leads to improved learner satisfaction within the blended learning pedagogy. This

intervening variable ranks second after IT infrastructure, in terms of size of effect, on learner satisfaction. Hypothesis 3 is therefore supported. This finding is validated by previous research findings (Smith and Hill, 2019; Bokolo *et al.*, 2022; Brenya, 2022). University administrators should train facilitators, learners, and IT support staff) in order to improve the quality of interactions. By doing so, it is possible to accomplish learner satisfaction by deploying blended learning. These learning environment interactions enrich the quality of teaching and learning, and subsequently learner satisfaction (Brenya, 2022).

H4. Learner attitudes have a positive effect on leaner satisfaction.

The effect of learner attitudes on learner satisfaction is positive and significant. A positive change in learner attitudes improves learner satisfaction. Hypothesis 4 is therefore supported. A number of studies validate this finding (Wichadee, 2018; Namyssova *et al.*, 2019; Dubey *et al.*, 2023). This finding further supports the theory of reasoned action that posits a link between attitudes and desired behavior. Learners should therefore, be encouraged to cultivate positive attitudes toward blended learning before the implementation of the pedagogy.

H5. Learning flexibility has a positive effect on learner satisfaction.

Learner flexibility has a positive and significant effect on learner satisfaction. A positive change in learner flexibility improves learner satisfaction. Hypothesis 5 is supported. This finding is validated by a number of research findings (Birbal *et al.*, 2018; Sahni, 2019; Su, 2019; Apandi and Raman, 2020). Blended learning involves utilizing a variety of learning methods that take cognizance of the diverse interests of students. Students are consequently encouraged to be more active and involved in learning. The flexibility of the blended learning system consequently creates a conducive learning atmosphere for optimal learning outcomes. Students can study at their own time and own pace. When students have more control over their schedules, their satisfaction with the course is likely to increase. However, learning flexibility does not mediate the effect of the independent variable on the dependent variable. There is no partial mediation lined to learning flexibility.

6. Conclusion
In the majority of low-income economies, the adoption of blended learning is mainly motivated by inadequate physical infrastructure. Seldom does it arise from a carefully considered planning procedure meant to incorporate more recent teaching and learning pedagogies. Despite the fact that most low-income economies do not have blended learning prerequisites, the pedagogy has been found to influence the effectiveness of learning. This study confirms four indirect predictors of learner satisfaction within blended learning pedagogy: IT infrastructure, social presence, learner attitudes, and learning flexibility.

6.1 Theoretical and practical contribution of the study
This study contributes to theory development and practice in several ways. It contributes to theory development by identifying predictors of learners' satisfaction as a result of deploying blended learning. These predictors include IT infrastructure, social presence, learner attitudes, and learning flexibility. This study supports the direct positive relationship between blended learning and learner satisfaction. The findings also support the hypothesized indirect effect of blended learning on learner satisfaction through IT infrastructure, social presence, and learner attitudes.

On a practical level, HEIs need to invest in planning and resource mobilization in order to realize several benefits derived from the use of blended learning. In order to achieve optimal

learning outcomes, it should be combined with information on the use of IT infrastructure for both facilitators and learners. In order to assist learners in developing competencies through consistent use, institutions should also invest in tailored blended learning technologies. In addition, emphasis should be placed on training all actors in order to better manage change.

6.2 Limitations and future research direction

There are two limitations to this study that affect the outcomes. First, this study is cross-sectional in nature. As a result, an in-depth understanding of the relationship between the variables studied is lacking. As a consequence, causality cannot be inferred. Secondly, data from all variables in this study come from a "single source". "Single-source bias" becomes a drawback. When evaluating the efficacy of blended learning, future studies should consider facilitator attitudes and teaching styles. Attitude plays a key role in motivating learners in blended learning and subsequently their level of satisfaction.

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