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Factors Influencing Student Satisfaction in Blended Learning: A Structural Equation Modelling Approach

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Abstract. Blended learning (BL) has become a buzzword in the educational settings. It is utilized to maximize and meet the expected learning outcomes. Regardless of the high demand for blended learning, certain challenges (i.e., student satisfaction) regarding its effective usage for educational purposes were observed. This work offers a structural model that explains students' satisfaction (SS) through integrating teacher support, peer support, perceived usefulness, perceived ease of use, and learning motivation. The proposed model was empirically tested in a learning environment in which BL was utilized as means of teaching and learning with 490 participants utilizing a convenient sampling in data gathering. Nine hypothesized paths were tested using partial least squares structural equation modelling (SEM). The findings suggested that learning motivation strongly predicts student satisfaction. However, teacher support and peer support did not translate to student satisfaction; nevertheless, teacher support positively influenced learning motivation. Moreover, perceived usefulness significantly influenced both learning motivation and student satisfaction. Additionally, perceived ease of use also positively influenced learning motivation and student satisfaction. The study emphasizes implementing effective BL in teaching and learning, while considering these various factors that lead to student satisfaction. These findings offer theoretical insights and practical implications for designing an effective blended learning environment that caters for and supports the needs of the students.

Keywords: blended learning, learning motivation, teacher support, perceived usefulness, perceived ease of use

1. Introduction

The COVID-19 pandemic has significantly transformed the educational landscape in higher education, locally and globally in modern history (Colclasure et al., 2021; Godber & Atkins, 2021; Sato et al., 2023). This global emergency has prompted a significant transition to blended learning (BL) education worldwide as a result of the closure of numerous colleges and universities (Guo et al., 2020). BL instruction

ensures that students are able to continue their education without interruption, even in situations where they are unable to attend school physically owing to unforeseen circumstances (Dayagbil et al., 2021). BL is an approach to education that carefully incorporates students, the environment, technology, and instructional approaches (Rensburg & Oguttu, 2022; Smith, 2019) with rich classroom learning to redesign the learning environment with higher degrees of freedom for learners (Smith & Hill, 2019). Joshi and Jamwal (2023) emphasized that with BL, students can interact with the study material, other students, and the instructor by using any online platform or by physically being there and attending lectures in a real classroom. Within the framework of Philippine education, the BL environment combines conventional teaching methods with synchronous and asynchronous set-ups to cater for students with different learning styles, while participating in online learning activities (Tupas & Linas-Laguda, 2020). The growing recognition of blended learning is a reflection of its potential for transforming the educational system by increasing accessibility, adaptability, and tailoring of instruction to meet the needs of each student (Attard & Holmes, 2022).

The practice of combining digital and face-to-face elements into blended learning courses is becoming the new normal in higher education and offers a promising learning format (Wiggers et al., 2023). Research in blended learning, both pre- and post-pandemic, has documented its effectiveness in enhancing the educational experience within the context of higher education (Alkhatib, 2018; Bhadri & Patil, 2022; Sawan et al., 2024; Serrano et al., 2019). Moreover, blended learning has emerged as a solution to enhance students' learning experience and engagement (Broadbent, 2017; Edward et al., 2018). For instance, BL has been found to be very effective in providing opportunities for students to experience (Bouilheres et al., 2020), meeting the academic needs of the students and during global crises (Bordoloi et al., 2021), enabling meaningful learning and supporting students' competence (Eija et al., 2024). In addition, BL offers a flexible solution to learning (Rahman et al., 2015), overcomes the limits of traditional classroom-based instruction (Ghazal et al., 2018), facilitates personalized educational pathways (Dziuban & Picciano, 2021; Whalley et al., 2021), enables students to participate actively in the learning process (Ismael et al., 2018), develops logical skills, and establishes social order (Subramaniam & Muniandy, 2019).

While blended learning is appreciated for several reasons, its application remains a challenging process in higher education (Bruggenab et al., 2021). For instance, there is inconsistency on the impact of blended learning on student motivation, performance, and engagement (Cao, 2023). Taylor and Williams (2021) noted that students frequently express frustration and dissatisfaction over the absence of timely and effective support from teachers. Similar results suggested that students frequently experience feeling underappreciated in such settings, where the personal interaction and feedback from teachers that they might experience in a fully traditional classroom are often missing (Crosby & Bryant, 2020; Ji et al., 2023). Thus, lack of specific guidance on how teachers support fostering student engagement in BL leads to dissatisfaction (Heilporn et al., 2021). Moreover, lack of resources, difficulties in maintaining communication, network disruptions and

lack of peer interaction contribute to poor implementation of blended learning (Gamage et al., 2022; Waha & Davis, 2014). Additionally, the lack of sufficient resources such as reliable Internet connectivity and the necessary software further complicates students' ability to engage effectively and be motivated by both digital and traditional aspects of their study (Gamage et al., 2022; Nguyen, 2020). Under such circumstances, these challenges in the application of blended learning can lead to a significant decrease in student satisfaction and a decline in motivation to learn. This scenario is briefly described in a study by Smith and Jones (2021), which found that students who faced these blended learning challenges expressed lower levels of satisfaction and motivation for their studies. Fernandez and Al-Asfour (2023) highlighted that beyond the direct academic implications, the psychological and social ramifications of these blended learning challenges such as feelings of isolation and reduced peer interactions play a significant role in diminishing students' enthusiasm and commitment to their studies. Moreover, these factors combine to create an environment in which students are less likely to thrive or feel positive about their educational experiences.

In the literature, previous findings have identified the perceived usefulness of BL platforms as significantly affecting student satisfaction (Alzahrani & Seth, 2021; Butt et al., 2023; Huang, 2021). Lin and Yu (2023) reported that perceived usefulness significantly impacts students' attitudes towards these tools. Aside from perceived usefulness, other underlying factors have been linked to student learning motivation and satisfaction. For instance, Tu and Hu (2020) emphasized that peer support has a profound effect on learning motivation and effectiveness in a BL environment, suggesting that peer support can be a critical component in student learning. This was supported by Min and Yu (2023) who suggested that peer support is essential for maximizing learning effectiveness in BL contexts. On the other hand, An et al. (2022) argued that teacher support positively affects learning engagement and is significantly associated with both technology acceptance and learning motivation. Zhao et al.'s (2020) empirical results showed that teacher support is vital in easing the transition to BL environments, and teacher support has been highlighted as a key factor in promoting motivation and satisfaction (Lin et al., 2020). Huang (2021) reiterated that support services are essential in a BL environment, assisting learners in overcoming challenges related to content understanding or technology use. Notwithstanding these important findings from the scientific literature, there remains an absence of a comprehensive framework that delineates the extent of student satisfaction with BL. It serves as the main point of departure of this work.

This work bridges such a gap by offering an overarching model that explains the factors that lead to student satisfaction with the implementation of BL in terms of perceived ease of use, usefulness, peer support, teacher support and resource support. The proposed structural model advances existing research by combining these important factors in order to explain the satisfaction of students. Moreover, the analyses developed from assessing the proposed student satisfaction model will contribute significant insights for the university to design proper support that

leads to students' satisfaction. Such initiatives contribute to building collective in providing quality education.

2. Literature Review

2.1. Historical Perspective of Blended Learning

Historically, BL has changed significantly over the past years. It merges the use of online digital media with traditional classroom methods. The term itself was first used during the late 1990s and early 2000s, a time when the Internet became more accessible and access to learning technologies progressed in their development (Graham, 2006). In the 2010s, the increased use of mobile devices and open, cloud-based technologies led to a huge surge in the use of interactive and dynamic learning environments (Bonk & Graham, 2006). The spread of the Coronavirus in 2020 accelerated the adoption of blended learning as all education institutions globally needed to integrate online learning resources rapidly and effectively. Sangster et al. (2020) highlighted the vital role that blended learning plays in providing access to flexibility, enhancing student engagement, and ensuring the continuity of teaching during crises. The latest trends highlight the need to improve BL practices that promote scalability and inclusiveness, ensuring that learning can be scaled to cater to different student contexts' needs (Castro et al., 2019).

Another important aspect that has emerged in BL environments is social presence, which combines online interactions in real time with activities that are available at any time. This is seen as crucial in building a sense of community and increasing motivation and satisfaction among students (Garrison & Kanuka, 2004). Since teachers and institutions have had to hone their BL practices in a rapidly changing environment, the question many ask is how best to strike the balance between technology integration and the need for technology to better serve, rather than substitute, the human aspects of teaching and learning (Salta et al., 2022). Nevertheless, the dynamic of development presents exactly which is defined by BL for it to be a flexible and important part of education practice, one that is applicable in the future, continually modified by new challenges or opportunities.

2.2 Blended Learning Environment

Blended learning is the process of combining online technologies with traditional classroom teaching methods (Muller & Mildenberger, 2021). The objective of BL environments as stated by Lane et al. (2021) is to enhance the student experience and the effectiveness of learning by integrating online and in-person interaction. Mikulecky (2019) highlighted that the incorporation of technology greatly enhances the effectiveness of a mixed learning environment, which may include e-learning or game-based learning. Blended learning is highly regarded by both teachers and students for its positive impact on critical thinking and problem-solving skills. When comparing technology-enhanced BL to traditional lecture-based methods, BL environments show significant improvements in academic performance (Salcedo, 2022; Selvakumar & Sivakumar, 2019). Adinda and Mohib (2020) argue that including attentive instructional design and mixed learning environments is essential to foster self-directed learning abilities and student-centred learning. Moreover, Buchan and Precey (2023) state that students'

engagement in BL is significantly correlated with the utilisation of high-quality virtual learning environment (VLE) materials, engaging teaching strategies, and formative evaluations. Students in BL environments are more likely to communicate and work together, which in turn leads to more engaging classroom discussions (Johler, 2022). Furthermore, BL methods vary to accommodate different levels of academic achievement and student preferences, suggesting that BL can improve learning results (Beukes et al., 2019). Moreover, since BL is an educational approach that combines traditional face-to-face classroom methods with online digital media and activities, it integrates various instructional strategies, learning environments, and technological tools to create a cohesive learning experience. BL aims to leverage the strengths of both in-person and online learning, providing a more flexible, engaging, and effective educational experience for students (Rensburg & Oguttu, 2022; Smith, 2019).

2.3 Teacher Support

The literature has extensively examined the significance of teacher support in BL conditions. Teacher support plays a diverse role within the context of BL, which combines online digital media with traditional classroom methods. Graham et al. (2019) argue that effective teacher support in BL environments involves more than just direct instructional approaches. It also entails offering technical and emotional assistance to students as they traverse online components. Koedinger and Aleven (2022) emphasize that tailored feedback and active teacher involvement are essential for sustaining student motivation and engagement in both online and in-person learning environments. In addition, according to research by Zhou et al. (2021), teachers may significantly impact their students' motivation by providing them with additional support. Therefore, the way professors engage with their students in a BL environment can greatly affect the level of student engagement. Thus, the following hypotheses were established:

H1. Teacher support has a positive influence on learning motivation.

H2. Teacher support has a positive influence on student satisfaction.

2.4 Peer Support

Blended learning combines online digital media with traditional classroom methods, offering distinct opportunities for peer interaction that are crucial for boosting student motivation. Engaging with peers in online forums and group projects promotes a feeling of inclusion and interpersonal bonding, which are essential for encouraging pupils (Smith & Jones, 2020). A recent study by Lee and Kim (2021) demonstrated that including peer support mechanisms into BL has two key advantages. Firstly, it creates a more encouraging learning atmosphere, which in turn boosts student motivation and engagement. According to the self-determination theory (Ryan & Deci, 2020), students' intrinsic motivation to participate in educational tasks is enhanced when they receive encouragement from their peers as this satisfies their craving for social connection. Furthermore, Patel et al. (2022) highlighted the significance of structured peer mentoring initiatives in interdisciplinary educational settings. Thus, the following hypotheses were established:

H3. Peer support has a positive influence on learning motivation.

H4. Peer support has a positive influence on student satisfaction.

2.5 Perceived Usefulness

In the context of BL methods, perceived usefulness, a core construct within the technology acceptance model (TAM), has been related to learning motivation. Perceived usefulness is described as the degree to which one believes an information technology artifact enhances performance in the activities of interest. Davis's (1989) original TAM definition posited that perceived usefulness influences user acceptance, and subsequently, use behaviour. Li et al. (2020) found that in BL environments, the perceived usefulness of online components positively influenced student engagement and motivation. In the study by Chen and Zhao (2021), results showed that the perception of usefulness is significantly linked with general technology usefulness, as well as the realization of value, while the usefulness of the learning device was positively connected with the students' intention to persist in BL settings. Perceived usefulness in BL methods is generally defined as the degree to which the user believes that using a particular system can significantly influence the results. The study by Zhang and Qin (2022) demonstrated that perceived usefulness not only directly affects academic achievement in BL environments but also indirectly affects academic achievement by engaging students more and enhancing their persistence in learning. Thus, the following hypotheses were established:

H5. Perceived usefulness has a positive influence on learning motivation.

H6. Perceived usefulness has a positive influence on student satisfaction.

2.6 Perceived Ease of Use

In BL environments, the perceived ease of use (PEOU) plays a significant role. According to Sun and Zhang (2006), research indicates that students are more inclined to engage with BL systems if they perceive them to be easy to use, enhancing their overall experience and satisfaction. This is crucial for educational settings such as schools where the impact of technology on student participation and achievement is particularly important (Teo, 2011). PEOU also significantly affects students' satisfaction with their education in BL contexts. When teaching tools are simple to find and use, students are less likely to become frustrated and more likely to enjoy learning, leading to greater satisfaction with the entire educational process (Liaw, 2008). This satisfaction can enhance learning outcomes and increase the likelihood of continued technology use (Roca & Gagne, 2008). Based on these considerations, the following hypotheses were formulated:

H7. Perceived ease of use has a positive influence on learning motivation on blended learning.

H8. Perceived ease of use has a positive influence on student satisfaction on blended learning.

2.7 Learning Motivation

Learning motivation is one of the major factors that influence educational success, particularly in BL environments. Research into motivation underpins many educational theories and is conducted within various educational settings. It encompasses intrinsic and extrinsic dimensions, where intrinsic motivation generates internal drive owing to inherent interest in the learning material, and extrinsic motivation is driven by rewards or obligations from others (Wigfield & Eccles, 2020). Motivation is identified as a critical factor in studying learning outcomes. Schneider et al. (2019) conducted a meta-analysis confirming that

higher levels of motivation consistently relate to higher achievements in schools, greater engagement with study materials, and better performance in tests and examinations across all educational levels, from primary to tertiary education. In the context of BL, motivation plays a bridging role. According to Clark and Mayer (2021), student motivation can predict the effectiveness of digital educational tools. Thompson and Lee (2022) found that effectively integrated digital tools with clear objectives can significantly enhance student motivation in BL environments. Thus, the hypotheses were established:
H9. Learning motivation has a positive influence on student satisfaction.

2.8 Student Satisfaction

Student satisfaction is a key factor in educational success, directly impacting academic outcomes and the overall learning experience (Boyd et al., 2022; Yu et al., 2021). Within the prevailing literature, high levels of student satisfaction are essential for creating a supportive and productive learning environment, especially in higher education. However, adverse situations, such as disasters or crises, can negatively impact student satisfaction and subsequently diminish their trust in the institution. This highlights the importance of understanding and enhancing student satisfaction for educational institutions. In the context of BL, student satisfaction is influenced by several factors, including teacher support, peer support, resource support, and perceived usefulness. Additionally, perceived usefulness of the BL system significantly impacts student satisfaction as students are more likely to engage and persist when they find the system beneficial (Boyd et al., 2022; Yu et al., 2021). Thus, this work attempts to evaluate this relationship between learning motivation and students' satisfaction. The proposed conceptual model is shown in Figure 1.

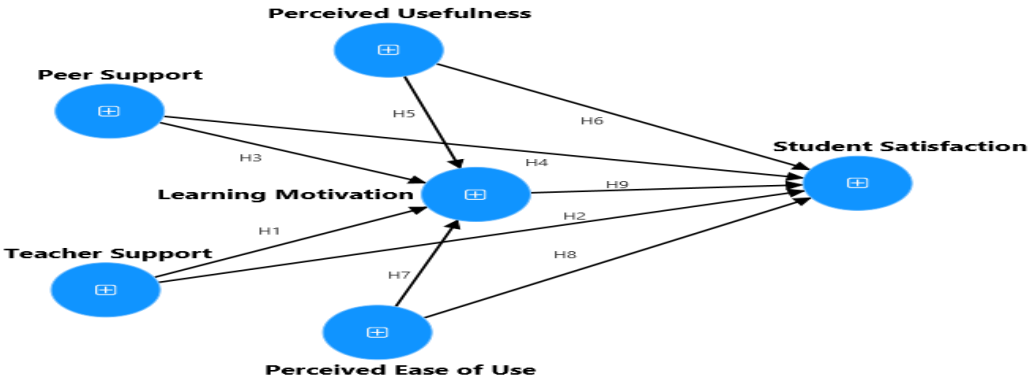

Figure 1. The proposed model for students' satisfaction towards blended learning in higher education

3. Methods

3.1 Instrument

The constructs in the proposed model were measured using items that were based on an extensive review of the literature (Appendix 1). Peer support (PS) had six measurement items, teacher support (TS) had five, perceived utility (PU) had five, perceived ease of use (PEOU) had five, learning motivation (LM) had six, and student satisfaction (SS) had five measurement items that were adapted from a

variety of sources (Appendix 1). Utilizing the five-point Likert scale, the survey instrument assessed each construct. The measurement items of all the constructs were from "Strongly disagree" to "Strongly agree." In order to identify additional enhancements to the questionnaire's instruction, question content, difficulty, wording, sequence, form, and formatting, a pilot test was implemented. Prior to the actual collection, the pilot test was administered to a small sample of fifteen respondents using the questionnaire that was adopted (Appendix 1). All necessary modifications were implemented in accordance with the feedback provided.

3.2. Data Collection

The survey was conducted with undergraduate students from Cebu Technological University, one of the most renowned state universities in the Philippines. A total of 490 participants were enrolled in this study through a convenient sampling procedure. Students who were enrolled in a BL environment during the first semester of 2023-2024 were invited to participate in the study. Furthermore, a consent form was affixed to the survey questionnaire to confirm that participants had been informed of the study's voluntary nature. Participants were granted an ample amount of time to complete the survey questionnaires, which were distributed individually. The data were collected online using Google Forms. In the PLS path model, the minimum sample size should be ten times the maximum number of arcs pointing to the latent variable, as per Hair et al. (2021). Consequently, the minimum sample size for this investigation was 90, as per Hair et al. (2021). Additionally, the 490 responses that were collected contained comprehensive responses, all of which were valid and included in the final analysis. The participants comprised freshmen (17.8%), sophomore (10.8%), junior (64.9%) and senior students (6.5%) of the College of Education under different majors (i.e., Early Childhood Education, Elementary Education, Social Science Education). The majority (83.3%) were female while 16.7% were male and ranged from 18 to 240 years of age.

3.3 Data Analysis Results

Measurement model assessment

This research used PLS-SEM path modelling for the direct relationships between the exogenous and endogenous constructs. PLS-SEM can handle complex models with multiple constructs and indicators, making it ideal for our model that includes constructs such as teacher support, peer support, perceived usefulness, perceived ease of use, learning motivation, and student satisfaction. PLS-based SEM is a much more sensitive and comprehensive statistical technique to derive structural models in high-complexity domains (Henseler et al., 2015). Unlike covariance-based SEM (CB-SEM), PLS-SEM is more robust with small to medium sample sizes.

Our sample size of 490 participants fits well within the acceptable range for PLS-SEM. It is appropriate for the models that are characterized by small samples and non-normality of data, formative measures, predictive and exploratory analyses (Hair et al., 2017). PLS-SEM simultaneously determines the optimal prediction of the relationships among the variables and also maximizes the amount of covariance that can be shared by all latent variables to enhance the model

interpretation (Sosik et al., 2009). In addition, PLS-SEM involves the development of a path model that is theoretically and logically developed among the variables and constructs (Hair et al., 2014). Initial criteria for assessing the model in PLS-SEM are the validation and reliability of the measures (Hair et al., 2017). The evaluation of the measurement model indicates that all the indicators exhibited convergence and reliability, as demonstrated in Table 1. Notably, the factor loading for each item surpasses the critical value of 0.70 (Henseler et al., 2009). Furthermore, the average variance extracted (AVE) statistics for each construct vary between 0.632 and 0.854, exceeding the suggested threshold of 0.5 (Fornell et al., 1981). This finding suggests that the convergent validity of each construct in the model was acceptable. Furthermore, it is important to highlight that all of the constructs displayed reliability, as evidenced by their values exceeding the composite reliability (CR) and Cronbach's alpha (α) thresholds of 0.70 (Hair et al., 2017).

Table 1. Measurement Model Assessment Results

Convergent Validity		Discriminant Validity			Convergent Validity		Discriminant Validity		
Loadings		AVE	α	CR	Loadings		AVE	α	CR
TS1	0.740	0.697	0.891	0.902	PEOU2	0.868			
TS2	0.828				PEOU3	0.892			
TS3	0.875				PEOU4	0.874			
TS4	0.838				PEOU5	0.788			
TS5	0.885				LM1	0.857	0.790	0.947	0.949
PS1	0.769	0.632	0.887	0.924	LM2	0.903			
PS2	0.802				LM3	0.916			
PS3	0.821				LM4	0.919			
PS4	0.804				LM5	0.863			
PS5	0.831				LM6	0.873			
PS6	0.738				SS1	0.924	0.854	0.957	0.957
PU1	0.905	0.808	0.921	0.921	SS2	0.907			
PU2	0.899				SS3	0.924			
PU3	0.883				SS4	0.939			
PU4	0.907				SS5	0.928			
PEOU1	0.789	0.711	0.899	0.916					

Note: α = Cronbach's alpha; CR = construct reliability; AVE = average variance; TS = teacher support; PS = peer support; PU = perceived usefulness; PEOU = perceived ease of use; LM = learning motivation; SS = student satisfaction.

The discriminant validity was supported by the AVE of the constructs, which was greater than the squared correlation of each latent variable (Fornell et al., 1981). The values in bold in Table 3 are the square roots of the AVE, while the values not in bold signify the intercorrelation values between the constructs. The Fornell and Larker's condition is met with all the off-diagonal values less than the square roots of the AVE.

Table 2. Correlation and Testing Discriminant Validity

	LM	PS	PEOU	PU	SS	TS
Learning Motivation	**0.889**					
Peer Support	0.543	**0.795**				
Perceived Ease of Use	0.762	0.61	**0.843**			
Perceived Usefulness	0.717	0.642	0.666	**0.899**		
Student Satisfaction	0.811	0.505	0.691	0.692	**0.924**	
Teacher Support	0.533	0.566	0.53	0.563	0.447	**0.835**

Note: The square root of AVE was shown on the diagonal of the matrix in bold; inter-construct correlation was shown off the diagonal.

Table 3. Path Coefficients and Hypothesis Test Results

Hypothesis	β	p-Values	Decision
H1: Teacher Support → Learning Motivation	0.089	0.015	Supported
H2: Teacher Support → Student Satisfaction	-0.056	0.090^{ns}	Not supported
H3: Peer Support → Learning Motivation	-0.046	0.255^{ns}	Not supported
H4: Peer Support → Student Satisfaction	-0.001	0.989^{ns}	Not supported
H5: Perceived Usefulness → Learning Motivation	0.364	0.000	Supported
H6: Perceived Usefulness → Student Satisfaction	0.217	0.000	Supported
H7: Perceived Ease of Use → Learning Motivation	0.501	0.000	Supported
H8: Perceived Ease of Use → Student Satisfaction	0.130	0.007	Supported
H9: Learning motivation → Student Satisfaction	0.586	0.000	Supported

Note: *** p < 0.001; ** p < 0.05; ns not significant.

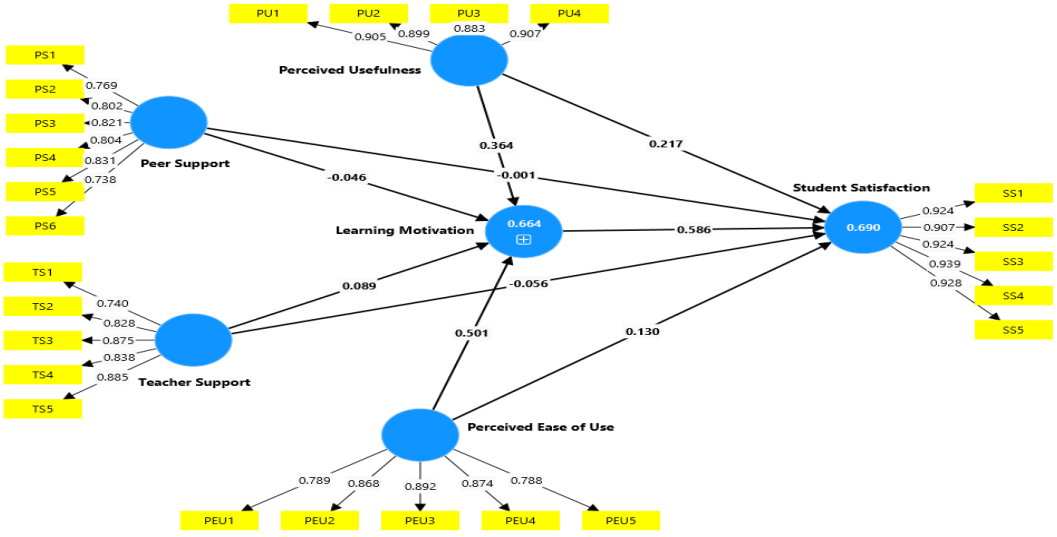

Figure 2. Structural Model Path Coefficients

Figure 2 displays the structural model's R2 value, which represents its prediction accuracy. R2 values of 0.75, 0.50, and 0.25 were considered acceptable according to the rule of thumb for prediction accuracy (Henseler et al., 2009; Hair et al., 2011).

With an R2 of 0.694 (69%), the model's R2 values demonstrated that SS accounted for the most variation. Also, with an R2 of 0.659 (66%), LM had a high variance explained. According to Hair et al. (2017), the PLS method was used to compute effect sizes (f2) for the link between the exogenous and endogenous components. The results showed that there were small effects (f2) of 0.02, medium effects (f2) of 0.15, and large effects (f2) of 0.35. A result below 0.02 signified that the endogenous construct was not influenced by the external constructs. In terms of LM, the f2 result indicated that PS had a medium influence and PEOU had an insignificant impact. On the other hand, LM was not influenced by TS and PU. In addition, PS and LM had significant effect on SS, while PEOU had little effect on SS. However, TS and PU had no effect on SS. The results are summarized in Table 4.

Table 4. Effect size (f^2) results

Relationship	f 2	Effect Size
TS→ LM	0.012	No effect
TS → SS	0.003	No effect
PS → LM	0.176	Medium
PS → SS	0.363	Significant
PU → LM	0.003	No effect
PU → SS	0.001	No effect
PEOU → LM	0.055	Small
PEOU → SS	0.016	Small
LM → SS	0.368	Significant

4. Discussion

This study proposed a structural model of student satisfaction on BL environments in higher education with the emphasis on understanding the direct relationship of Teacher support (TS); Peer support (PS), Perceived usefulness (PU); Perceived ease of use and Learning motivation (LM) towards Students' satisfaction (SS). The PLS-SEM path coefficients of the proposed model revealed that only H2, H3 and H4 were not supported, while H1, H5, H6, H7, H8 and H9 were all supported. These findings are consistent with prior studies highlighting that TS plays a crucial role in enhancing LM in BL environments. In addition, the presence of an engaged and supportive teacher can foster a more conducive learning atmosphere, encouraging student participation and persistence (Al-Fraihat et al., 2020; Khalil & Ebner, 2017). This finding also aligns with previous studies suggesting that supportive and engaged teachers can boost students' motivation by creating a more interactive and encouraging learning environment. For example, Al-Fraihat et al. (2020) found that TS significantly influences students' engagement and LM in e-learning systems. Surprisingly, TS did not positive influence on SS. The non-significant and negative path coefficient suggested that TS does not have a direct impact on SS. This result contrasts with some studies where teacher support was found to be a key driver of student satisfaction (Liaw, 2008). It may indicate that in this particular blended learning context, other factors such as the quality of the content or technological infrastructure might play a more critical role in determining SS. Findings also showed that PS does not have a positive influence on LM. This finding diverges from some studies suggesting that PS can enhance LM through collaborative

learning and peer feedback (Khalil & Ebner, 2017). Moreover, result also showed no significant effect of PS on SS. This finding is consistent with the notion that peer interactions might not be a primary determinant of SS in blended learning environments, where individual engagement with content and technology can be more influential (Sun et al., 2008).

On the other hand, a significant positive relationship was established between PU and LM. This is in line with Davis's (1989) technology acceptance model (TAM), which posits that PU is a strong predictor of user acceptance and LM. In addition, PU had also significantly influenced SS, suggesting that when students find the e-learning tools beneficial, their overall satisfaction with the learning experience increases. This supports findings from Islam (2013), who reported a strong connection between PU and SS in e-learning contexts. Moreover, PEOU significantly influenced LM. This positive relationship indicated that easy-to-use learning platforms significantly enhance LM. This is consistent with findings by Venkatesh and Bala (2008), where PEOU was a critical factor in LM. PEOU also positively affected SS, although to a lesser extent than LM. This indicated that user-friendly interfaces contribute to a more satisfying learning experience. Lastly, LM had a significant influence on SS. The strong and significant positive relationship between learning motivation and student satisfaction underscored the importance of motivation as a key driver of satisfaction. Motivated students are more likely to engage with the material and feel satisfied with their learning experience, as supported by Artino (2012).

Considering the values of the path coefficients, LM was the strongest predictor of SS (β=0.586). The strong predictive power of LM on SS highlighted the importance of designing educational experiences that prioritize student motivation. Thus, teachers must focus on strategies to boost student motivation to improve satisfaction outcomes. PU was the second strongest predictor of SS (β=0.217). This indicates that PU underscores the importance of designing e-learning environments that elevate SS. Focusing on the utility and practical application of learning materials and tools, teachers and administrators could enhance SS. Moreover, PEOU was also perceived as predictor of SS (β=0.130). This indicates that designing e-learning environments that are easy to navigate and user-friendly lead to SS. Moreover, by using BL platforms and ensuring they are accessible and easy to navigate (e.g., LMS), educational institutions can enhance SS. Thus, it is important to simplify the navigation structure of e-learning platforms to make it easy for students to find and access the resources they need. Learning institutions must provide consistent support to students, especially in the advent of the changing environment in education.

5. Conclusions

Despite the popularity of the BL platform in higher education, understanding students' satisfaction is limited in the literature. Thus, this work proposes a theoretical model that explains student satisfaction. Such an agenda informs the design of initiatives for learning institutions (i.e., higher education) to maintain better quality education. In the process of achieving this, much learning is realized to improve student satisfaction, especially given that the learning flatform (i.e.,

blended learning) is a critical component in providing quality education. The findings of this study offer significant theoretical implications for higher education institutions aiming to enhance student satisfaction in BL environments. The vital role of learning motivation as the most significant indicator of student satisfaction highlights the need for educational approaches that actively foster and sustain student motivation. This aligns with self-determination theory, suggesting that when students' intrinsic and extrinsic motivations are nurtured, their overall learning experience and satisfaction improve significantly. Moreover, as perceived usefulness is one of the strong predictors of both learning motivation and student satisfaction, higher education institutions must therefore design and implement e-learning tools that are not only functional but are also perceived by students as beneficial to their academic success. Finally, a user-friendly learning platform is necessary to support learning motivation and increase levels of satisfaction. These theoretical insights provide highlights on the role of learning motivation, perceived usefulness and perceived ease of use in student satisfaction.

5.1 Practical Implications

These insights contribute to the practice of understanding student satisfaction in BL environments in higher education. To enhance student satisfaction, institutions should implement strategies that boost learning motivation. This can be achieved through the provision of interactive content, timely and constructive feedback, and by providing students with self-regulated learning experiences. Additionally, perceived usefulness highlights the need for institutions to foster the development and acquisition of useful e-learning tools and materials that can be easily integrated into the students' learning processes. Ensuring these tools are perceived as beneficial to academic success is crucial. Perceived ease of use underscores the necessity to design these tools to be user-friendly. This involves improving user interfaces to be simple, ensuring easy navigation, and providing technical support to help students maximize the use of these tools within these platforms. In practical terms, enhancing motivation, utility, and ease of use from the institution's perspective can lead to the integration of a more supportive and satisfying learning environment, which best meets the needs and expectations of the students. This comprehensive approach can significantly contribute to higher levels of student satisfaction and better academic outcomes.

5.2 Limitation and Future Research

The empirical findings may be considered in the light of some limitations. Although the findings of this study provide some useful insights into factors leading to student satisfaction in BL environments, the study has a number of limitations that should be addressed in future research. The first of these is the sample of the study, where only the college of education under higher education was taken into consideration. The generalizability of findings from this study will be significantly increased if future studies employ samples of all populations from all educational settings. Future research may also want to include more objective measures for student engagement and satisfaction. Third, this study did not control some of the potential moderators, such as demographic variables (age, gender, prior experience with BL), which could impact the relationships in the study. These limitations would then be overcome, enhancing further

development in understanding about what factors really drive student satisfaction and therefore designing more effective strategies in BL.

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Appendix 1. Measurement Items

Constructs	Indicators	References
Learning Motivation	LM1: I think this way of learning in class is interesting LM2: I think this way of learning in class is valuable. LM3: I want to learn more in this way of learning in class. LM4: I think it is worth applying this way of learning in class. LM5: I think it is important for every student to learn to apply this way of learning in class	Hwang et al. (2013)
Teacher support	TS1: Communication with teachers is important and valuable. TS2: Teachers are willing to communicate with students. TS3: Teachers create an environment conducive to learning in the process of blended learning TS4: The teachers clearly inform the students of the grading policy for blended learning courses. TS5: The teacher is proficient in all the content involved in the course.	Ozkan et al. (2009), Shen & Wu (2020)
Peer Support	PS1: When I encounter difficulties in my studies, I can rely on my friends. PS2: My friends can share happiness and sadness with me during the learning process. PS3: Classmates share many valuable learning materials with each other during the learning process. PS4: When I encounter difficulties in my studies, my classmates give me advice. PS5: Discussing with friends helps me solve the difficulties that I encounter in my studies PS6: My friends (classmates) can truly help me in the learning process.	Zimet et al. (1988)
Student Satisfaction	SS1: I am satisfied with this way of learning in class. SS2: If I still have the opportunity to apply this way of learning in class, I will be happy to do so. SS3: I think it is a wise choice to study courses in this way of learning in class. SS4: I feel very satisfied with this way of learning in class. SS5: I am satisfied with my overall experience in this course	Sun et al. (2008)

Perceived Usefulness	PU1: This way of learning in class enriches learning activities PU2: This way of learning in class is very helpful for me to acquire new knowledge PU3: The learning mechanism provided by this way of learning in class makes the learning process smoother. PU4: This way of learning in class helps me get useful information when I need it.	Hwang et al. (2013)
Perceived Ease of Use	PEOU1: The kind of operating system by this way of learning in class is not difficult for me. PEOU2: It only took me a short time to fully understand how to apply this way of learning in class PEOU3: The learning activities in this way of learning in class are easy to understand and follow. PEOU4: I quickly learned to apply this way of learning in class. PEOU5: I think the system interface of this way of learning in class is easy to use	Hwang et al. (2013)