

Students' Perceptions on Blended Learning in an Indonesian Higher Education

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ABSTRACT

Objective: This study examines student perceptions of blended learning by exploring their initial experiences within an Indonesian higher education context. The focus is on understanding students' preferences across learning modalities, their perceived effectiveness, and the perceived advantages and challenges associated with blended learning environments. **Method:** The data were collected from 95 undergraduate students using a structured questionnaire comprising both closed- and open-ended items. Descriptive statistics were used to analyze the quantitative data, and Exploratory Factor Analysis (EFA) in JASP to identify the latent structure of student perceptions. Meanwhile qualitative responses were analyzed thematically to capture experiential insights. **Results:** Results show a clear gap between students' preferences and participation trends. Face-to-face learning was experienced as the most effective modality, but the highest attendance was recorded in asynchronous LMS-supported sessions. This indicates the importance of flexibility in learning behaviour. Qualitative results identify some challenges related to online learning, especially concerning understanding, interaction and motivation. This is further demonstrated by the EFA results, that students do not perceive blended learning as an integrated system. Rather, it is as a set of distinct pedagogical and psychological experiences across different modalities. **Novelty:** This study contributes to the literature by identifying a behavior-preference gap in blended learning and by demonstrating that flexibility operates as a key driver of student engagement. It advances the conceptualization of blended learning as a multidimensional and segmented learning ecosystem, emphasizing the need for stronger alignment between flexibility, instructional design, and learning support to ensure pedagogical effectiveness.

INTRODUCTION

The higher education landscape has undergone substantial transformation in the last two decades. There has been an increase in the need for learning flexibility since the global impact of the COVID-19 pandemic. All of these have shaken the conventional education system. This is also in line with the advancement of digital technology. One of the most prominent responses to this change is the emergence of the 'blended learning' model, a pedagogical approach that combines face-to-face learning with online components, both synchronous and asynchronous, in one integrated learning framework (Lalima & Dangwal, 2017). Blended learning is also often referred to as the "middle way" (Ningtyas & Sihombing, 2023) between conventional learning and fully online learning (Werdingingsih et al., 2024). It allows lecturers and students to interact in various learning modes. It also encourages more independent, adaptive, and contextual learning (Nurillah et al., 2025; Simangunsong et al., 2022).

From a theoretical perspective, blended learning intersects with key constructs in learning sciences, particularly self-regulated learning (SRL) (Panadero, 2017) and cognitive load theory (Sweller, 2020). The flexibility embedded in blended

environments enables learners to manage their own time, pace, and engagement strategies, thereby promoting autonomy and self-regulation. However, this same flexibility may also increase cognitive and organizational demands, especially when instructional design lacks coherence or adequate scaffolding. Consequently, blended learning should not be viewed solely as a technological innovation but as a complex pedagogical-psychological system in which learner behavior, perception, and performance are shaped by the interaction between modality, instructional design, and individual regulation processes (Asyari & Rasidi, 2022; Boelens et al., 2017).

The Indonesian Ministry of Research, Technology and Higher Education (MoRTHE) piloted the blended learning method with a program called SPADA-Indonesia (Salmaa, 2022). SPADA is an acronym for *Sistem Pembelajaran Daring*, which means Online Learning System. It aims to provide students with access to high-quality education through blended or through hybrid learning (Liza, 2023). According to preliminary research of 50 lecturers in Indonesia, 84% lack appropriate understanding in blended learning. Most of them (74%) lack understanding on selecting appropriate blended learning activities (Chaeruman et al., 2018). Studies have been conducted to evaluate the effectiveness of blended learning. However, most of these studies focused on evaluations from the perspective of infrastructure, policy and teacher capacity, not students' perspective (Anggraeni et al., 2022; Hafiz et al., 2025; Khasanah et al., 2024; Maharani et al., 2025). A study conducted by Setyaningsih (2020) about students' perspective, but only limited to English language learning. A study evaluating blended learning in general from a student perspective is needed, especially since blended learning is supposed to be student-centered and require students to take a more active role in their learning. Therefore, this study is crucial.

The adoption of blended learning is increasingly widespread in Indonesian university (Anthony et al., 2022; Herliani et al., 2023; Yusuf et al., 2024). This is mainly implemented to improve the quality and competitiveness of their study programs. The *Merdeka Belajar* (independent learning) policy and the demands of digital acceleration have also encouraged universities to design more structured blended learning models (Junaidi, dkk., 2020). It is said that blended learning "is very suitable for the learning styles of the millennial generation and generation Z and provides students with the opportunity to utilize ICT to conduct big data-based information searches" (Junaidi, dkk., 2020). One of the practices currently being implemented is blended learning scheduling based on the division of meeting types: face-to-face, synchronous online (for example via Zoom or Google Meet), asynchronous online (using LMS or MOOC platforms). With this structure, it is hoped that students can experience a flexible but still focused and meaningful learning process.

This study specifically examines students' perspective on the implementation of blended learning that is systematically scheduled at a private university in Indonesia. Although blended learning in Indonesian higher education has been the subject of several studies, most of them focused on institutional readiness, infrastructure, policy implementation, or lecturer competencies. The perceptions of students toward structured blended learning systems that combine two or more instructional modalities within a semester have received little attention. Moreover, it is not known if students see these modalities as one integrated experience or as separate learning environments. This gap is particularly important for first year students as they are still adapting to learning practices at university. Thus, this study investigates students' perceptions of a

systematically scheduled blended learning model and also explores the latent structure of the perceptions. To achieve this, the study adopts a mixed-methods approach combining descriptive analysis, thematic exploration, and exploratory factor analysis (EFA) to uncover the latent structure of student perceptions. By focusing on first-year undergraduate students experiencing blended learning for the first time, the study captures initial adaptation processes and authentic learner responses to systematically structured blended environments.

The contribution of this study is threefold. First, it advances the conceptualization of blended learning as a multidimensional and psychologically differentiated system, rather than a homogeneous instructional format. Second, it identifies flexibility as a central behavioral driver that may influence student engagement more strongly than perceived instructional effectiveness. Third, it provides empirical evidence from an underrepresented educational context, offering insights with both local relevance and broader theoretical implications.

By integrating behavioral, perceptual, and latent structural analyses, this study seeks to contribute to a more nuanced understanding of how blended learning can be designed and implemented to balance flexibility, cognitive demands, and pedagogical quality in higher education. This study differs from most previous studies that tend to only assume the effectiveness or ineffectiveness of blended learning based on theoretical frameworks or the perspectives of lecturers and institutions (Salim, 2023; Simangunsong et al., 2022). The state of the art of this study lies in its approach that directly involves students as the main users of the blended learning system, so that the data obtained reflects real experiences, authentic perceptions, and actual needs of students in the university environment. Although this study was conducted at one university, this study can be replicated in a broader context to get a broader picture.

This study, therefore, aims to explore the students' perception of a systematically structured blended learning model in the Indonesian higher education context. Specifically, it aims to: (1) identify students' preferences and participation patterns across learning modalities; (2) examine perceived effectiveness, comfort, advantages, and challenges of blended learning; and (3) explore the latent structure of these perceptions through Exploratory Factor Analysis (EFA).

RESEARCH METHOD

This study employed a mixed-methods approach integrating quantitative and qualitative techniques to capture both the measurable trends and the underlying meanings of students' experiences with blended learning. Specifically, a convergent parallel design was adopted, in which quantitative and qualitative data were collected simultaneously and analyzed independently before being integrated during interpretation. This design enables a more comprehensive understanding of student perceptions by triangulating numerical patterns with narrative insights.

In addition, an exploratory factor analysis (EFA) was conducted to examine the latent structure underlying students' perceptions, allowing the study to move beyond descriptive analysis toward identifying conceptual dimensions of blended learning experiences. The participants consisted of first-year undergraduate students enrolled in a study program at a private university in Indonesia. These students were selected purposively, as they had recently experienced blended learning for the first time, making them particularly suitable for capturing initial perceptions and adaptation

processes. A purposive sampling strategy was used to capture students' initial experiences with a structured blended learning environment. First-year students were considered especially relevant because they had just completed their first semester of use of the blended learning model of the institution, and had experienced all modalities of learning. The cohort was relatively homogeneous which helped to minimize variation due to different levels of academic seniority, prior university experience and program characteristics, thus enabling a more focused examination of perception patterns and adaptation processes.

The total population comprised 112 active students, from which 95 respondents provided valid and complete responses. The sample size exceeded the minimum requirement determined using the Slovin formula with a 5% margin of error (minimum $n = 87$), indicating adequate representation for descriptive and exploratory analysis. The use of a relatively homogeneous cohort supports internal consistency; however, it limits generalizability, which is acknowledged as a study limitation.

The study was conducted within a structured blended learning system spanning a 16-week semester, combining multiple instructional modalities: 7 face-to-face meetings, 5 synchronous online sessions (Zoom Meeting), 2 asynchronous LMS-based sessions, additional assignments via MOOC platforms, Midterm and final evaluations.

Data were collected using a structured questionnaire administered via Google Forms, consisting of closed-ended items using Likert-scale questions (e.g., effectiveness, comfort) and multiple-choice items (e.g., preferences, attendance) and open-ended questions. These are designed to capture students' perceived advantages and disadvantages of blended learning. The instrument's reliability was assessed using Cronbach's Alpha and McDonald's Omega. The results indicated satisfactory internal consistency (Cronbach's Alpha = 0.788; McDonald's Omega = 0.810), suggesting that the questionnaire provided reliable measurements of students' perceptions of blended learning.

Data collection was conducted at the end of the semester to ensure that respondents had experienced all learning modalities. Participation was voluntary, and respondents were informed about the purpose of the study, confidentiality of responses, and their right to withdraw at any time. No personally identifiable information was collected, ensuring anonymity and ethical compliance.

Quantitative data were analyzed using descriptive statistics, including frequencies and percentages, to identify patterns in attendance across learning modes, learning preferences, perceived effectiveness, and comfort levels. These descriptive results provide an empirical overview of students' behavioral trends and evaluative judgments.

To explore the underlying structure of students' perceptions, an Exploratory Factor Analysis (EFA) was carried out using JASP software. The suitability of the data for factor analysis was first checked using the Kaiser-Meyer-Olkin (KMO) measure to assess sampling adequacy, along with Bartlett's Test of Sphericity to confirm that the variables were sufficiently correlated. The analysis used Principal Component Analysis (PCA) as the extraction method, followed by oblimin rotation to allow for correlations between factors. Factors were retained using a combination of the Kaiser criterion (eigenvalues > 1.0) and parallel analysis. In the parallel analysis procedure, observed eigenvalues were compared with eigenvalues generated from random datasets of equivalent size. Only factors whose observed eigenvalues exceeded the corresponding

simulated eigenvalues were retained. Both criteria supported the retention of five factors.

For the qualitative analysis through responses to open-ended questions were analyzed using thematic analysis. It followed three stages: coding, categorization, and interpretation. This approach enabled the identification of dominant themes such as flexibility, technical challenges, and motivational issues, providing contextual depth to the quantitative findings.

The quantitative and qualitative findings were integrated at the interpretation stage. Quantitative results provided general patterns (e.g., attendance trends, preference distribution), while qualitative insights explained the underlying reasons behind these patterns.

RESULTS AND DISCUSSION

Results

Quantitative Results

Attendance Patterns

Student attendance is distinguished based on three types of meetings: face-to-face, synchronous online via Zoom, and asynchronous online via LMS and via MOOC. Most of the respondents indicated high levels of attendance and participation in all learning modes. This was reflected in the predominance of "Yes" responses for face-to-face attendance, synchronous Zoom sessions, and active participation in asynchronous learning through the LMS platform. These findings indicate that students maintain sufficient discipline in participating in all learning activities, both online and offline. Attendance rates were high across all learning modes, particularly in LMS-based asynchronous sessions, that can be observed from Table 1.

Table 1. Students' attendance.

Mode	Always attend	N Respondents	Percentage
Offline	83	95	87,37%
Online synchronous (Zoom)	75	95	78,95%
Online Asynchronous (LMS)	88	95	92,63%
Online MOOC	74	95	77,89%

Differences across modes were evident. The data showed that the highest student attendance rate was found in asynchronous learning through LMS, with an attendance rate of 92.63%. Face-to-face attendance sessions were also high (87.37%). Conversely, attendance rates for synchronous online sessions (Zoom) and MOOC were relatively lower, with 78.95% and 77.89%, respectively.

Preferences on study mode

The responses to the inquiry concerning students' preferences are illustrated in Figure 1 presents students' learning experiences. It is important to note that the respondents are allowed to multi-select the options. The multi-select nature of this question also reveals that students do not view learning methods dichotomously, but rather as a complementary learning ecosystem. Some students chose more than one learning mode, indicating that blended learning is perceived not as a single system, but as a combination of learning resources that can be utilized as needed. This demonstrates

that students are beginning to develop flexibility in their learning strategies, even though their preference for face-to-face learning remains dominant.

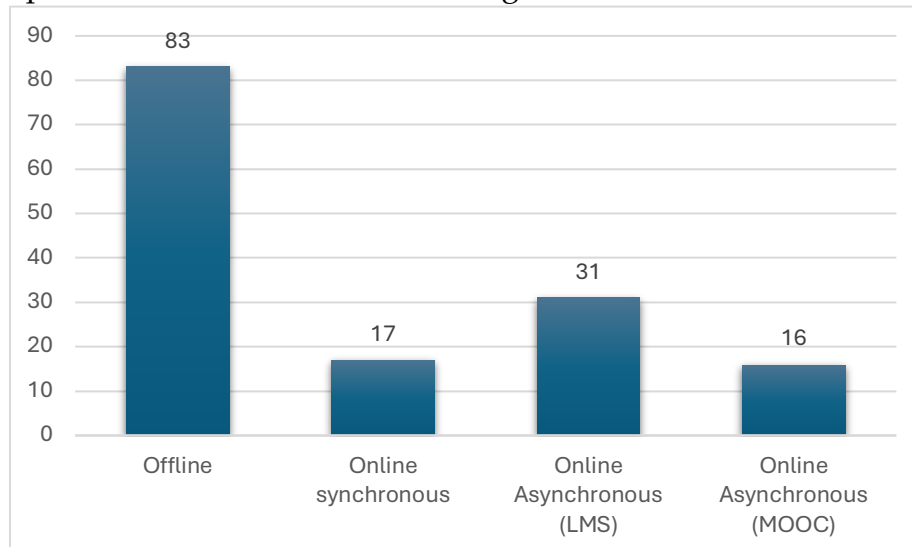


Figure 1. Students' preferences on study mode

The results showed that face-to-face learning was significantly perceived as the most helpful method for understanding the material. Eighty-three respondents (87.4%) ranked face-to-face as their primary choice, far surpassing other learning modes. Conversely, online learning exhibited a more diverse outcome. The asynchronous model through LMS ranked second with 31 respondents (32.6%). When these preference data are compared with the attendance patterns shown in Table 1, a clear behavior-preference gap emerges. Although face-to-face learning was the most preferred mode, LMS-based asynchronous learning recorded the highest attendance rate, indicating that flexibility may influence actual learning behavior more strongly than stated preferences.

Perceived effectiveness of blended learning

Students' perceptions of the effectiveness of blended learning were measured using a Likert scale (1 = strongly agree to 5 = strongly disagree). The results indicate a moderate but generally positive evaluation of the system.

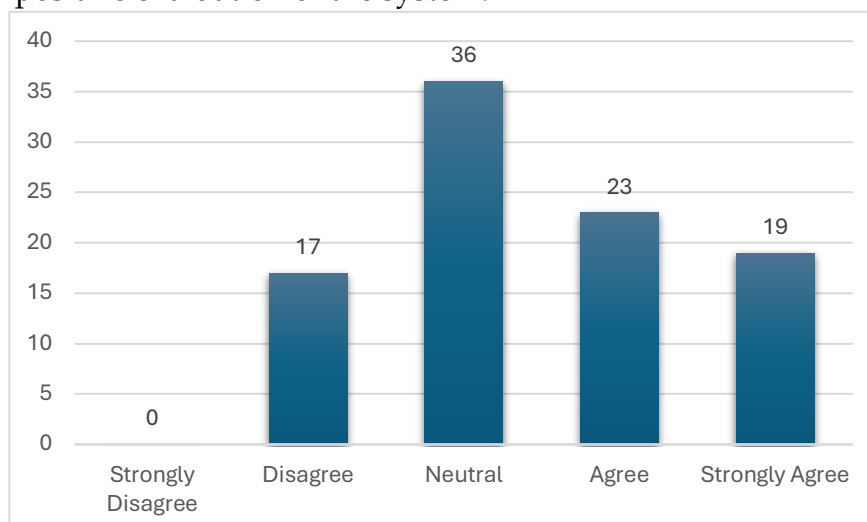


Figure 2. Students' perceptions of the effectiveness of blended learning

Findings indicated a tendency toward positive to moderate perceptions from students. Responses showed that 19 respondents (20%) strongly agreed that blended learning was effective, 23 respondents (24.2%) agreed, most respondents remained neutral (36 respondents or 37.9%), 17 respondents (17.9%) disagreed, and no respondents strongly disagreed. While positive responses outnumber negative ones, the high proportion of neutral responses suggests that students' experiences are not uniformly positive. Rather, their perceptions appear to vary depending on the specific modality, course design, or learning conditions.

Perceived comfort levels

Based on the data presented in the diagram below, students' perceptions of comfort in blended learning classes show a very positive trend. A large proportion of respondents indicated that they felt comfortable or very comfortable. The data shows that 30 respondents chose Strongly Agree, 32 respondents chose Agree, and 32 respondents were Neutral. Only one respondent reported discomfort, and none reported strong dissatisfaction.

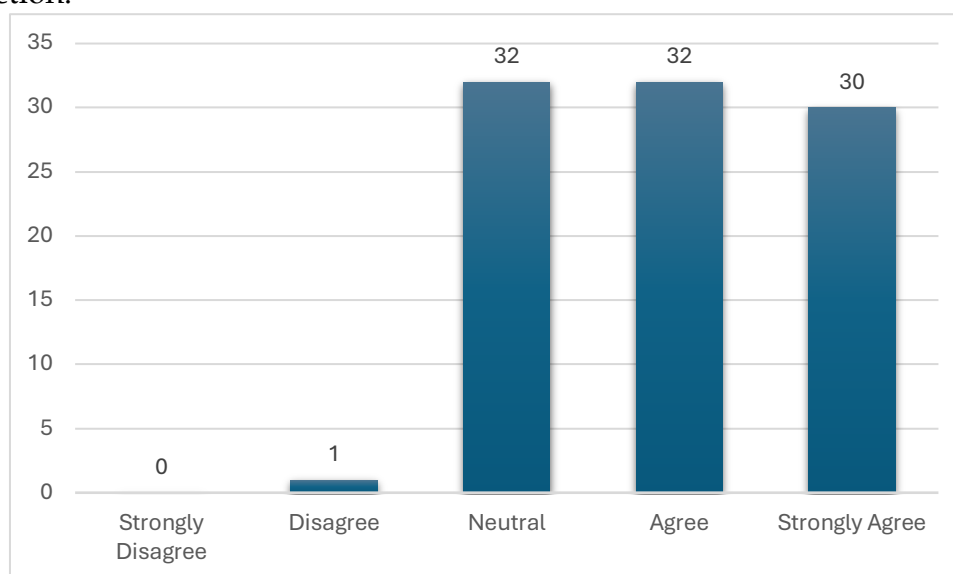


Figure 3. Students' perception of comfort levels in blended learning

These results suggest that blended learning is broadly accepted at an experiential level, even if it does not consistently translate into strong perceptions of effectiveness.

Qualitative Results

Perceived Benefits of Blended Learning

The qualitative findings indicate that students' perceptions of blended learning advantages are predominantly centered on flexibility in time and place. Most respondents explicitly used terms such as "flexibility", "flexible time", and similar expressions, demonstrating the centrality of this theme.

Flexibility was reflected in several aspects, including flexibility in dividing study time between academic and work responsibilities, completing assignments, choosing study locations, and reviewing learning materials. For instance, students highlighted the ability to replay instructional videos, which enhanced their understanding and control over learning pace.

Beyond scheduling convenience, flexibility was interpreted as greater autonomy over the learning process. Students reported being able to regulate their own study rhythm, organize independent learning, and select approaches suited to their personal needs. This suggests that blended learning is perceived as a system that facilitates student-centered learning and self-directed engagement.

In addition, students identified blended learning as supporting independent learning and personal responsibility. Frequently mentioned terms included “time management”, “prioritization”, and “efficiency”. These responses indicate that blended learning assists students in balancing academic tasks, work commitments, and personal activities, functioning not only as a learning model but also as an academic life management tool.

Although less frequent, several responses included affective-related terms such as “motivation”, “discipline”, “focus”, “emotional comfort”, and “confidence”. Other contextual factors like “monotony”, “rest”, “traffic”, and “double workload” also emerged. These findings suggest that blended learning has secondary impacts on students’ emotional well-being and learning experiences, even if these aspects are not dominant themes.

Perceived Challenges of Blended Learning

The most dominant challenge identified by students relates to technical issues, particularly internet connectivity. Words such as network, signal, internet, lag, and connection appeared consistently across responses. Students reported disruptions during synchronous sessions (e.g., Zoom), difficulties accessing learning platforms, interrupted quizzes, and delays caused by unstable connections.

These findings indicate that blended learning is perceived as a technically vulnerable system, highly dependent on external infrastructure beyond students’ control. A second major theme concerns pedagogical challenges, especially difficulties in understanding learning materials. Students expressed that online explanations were often less clear and less direct compared to face-to-face learning. Common issues included delayed feedback, limited opportunity to ask questions, and challenges in engaging with complex content.

Limited interaction also emerged as a key issue. Students reported difficulty in building meaningful discussions and receiving immediate responses from lecturers. This lack of interaction not only affects academic understanding but also reduces emotional engagement and learning motivation. Furthermore, several responses highlighted issues related to self-regulation and psychological factors, such as laziness, drowsiness, lack of focus, decreased motivation, and procrastination. Students noted that unstructured home learning environments and limited supervision contributed to these challenges. Overall, the results show that while blended learning offers flexibility, it also presents significant technical, pedagogical, and psychological challenges.

Exploratory Factor Analysis (EFA)

To further examine the structure of students’ perceptions, an Exploratory Factor Analysis (EFA) was performed. The results indicated a KMO score of 0.722, confirming that the data were suitable for factor analysis. Bartlett's Test of Sphericity was also significant ($p < 0.001$), indicating that the correlations between variables were strong enough to warrant factorial analysis.

The analysis identified five factors, together accounting for 56% of the total variance. As shown in Table 2, the first factor explained the largest proportion of variance (22.2%), followed by the second factor (14.4%), while the remaining factors contributed smaller but meaningful proportions.

These factors represent distinct dimensions of blended learning experiences, consisting of: (1) synchronous online learning, (2) MOOC-based learning, (3) face-to-face learning, (4) asynchronous LMS-based learning, and (5) flexibility as a psychological construct. This structure indicates that students do not perceive blended learning as a single unified system, but rather as a set of differentiated learning experiences.

Table 2. Eigenvalues and Percentage of Variance Explained

Factor	Eigenvalue	% Variance	Cumulative %
Factor 1	5.334	22.2	22.2
Factor 2	3.459	14.4	36.6
Factor 3	2.105	8.8	45.4
Factor 4	1.451	6.0	51.5
Factor 5	1.082	4.5	56.0

The rotated factor loadings (Table 3) show that most items loaded strongly on their respective factors, supporting the interpretability of the structure. However, several items related to concentration difficulties and cognitive fatigue (e.g., A6, B6, C6, D6) exhibited high uniqueness values (> 0.90), suggesting that these aspects are not well captured within the extracted factor structure.

Table 3. Rotated Factor Loadings (Oblimin Rotation)

Item	Factor 1 (Sync)	Factor 2 (MOOC)	Factor 3 (Offline)	Factor 4 (LMS)	Factor 5 (Flexibility)	Uniqueness
D1	0.875	-	-	-	-	0.226
D2	0.833	-	-	-	-	0.242
D4	0.615	-	-	-	-	0.301
D5	0.460	-	-	-	0.470	0.468
A3	-	-	0.938	-	-	0.150
A1	-	-	0.825	-	-	0.291
A2	-	-	0.775	-	-	0.371
A4	-	-	0.774	-	-	0.304
A5	-	-	0.435	-	0.434	0.627
C2	-	-	-	0.713	-	0.325
C4	-	-	-	0.650	-	0.363
C1	-	-	-	0.455	-	0.518
C5	-	-	-	0.939	-	0.114
A6	-	-	-	-	-	0.957
B6	-	-	-	-	-	0.965
C6	-	-	-	-	-	0.913
D6	-	-	-	-	-	0.945

Taken together, the results reveal a consistent pattern. Students actively engage with all learning modes, particularly those offering flexibility. However, they still prefer face-to-face learning for its perceived effectiveness and clarity. This indicates a divergence between learning behavior and learning preference, suggesting that students may prioritize accessibility and convenience in practice, even when they believe other modes are more pedagogically effective. Furthermore, the findings highlight that blended learning is experienced as a multidimensional and segmented system, shaped by

differences in interaction quality, instructional clarity, technical reliability, and psychological demands.

Discussion

The findings of this study reveal that blended learning is not experienced as a unified instructional model but rather as a multidimensional and segmented learning system, in which different modalities are perceived and utilized in distinct ways. This insight extends existing research by showing that students cognitively differentiate between learning modes instead of approaching blended learning as a coherent whole. The EFA results support this interpretation, as the JASP factor loadings clustered around separate modality-specific dimensions (face-to-face, synchronous online, LMS-based learning, and MOOC-based learning) rather than a single overarching blended-learning construct. This pattern can be interpreted in relation to the design challenges identified by Boelens et al. (2017). The emergence of flexibility as a distinct factor reflects the challenge of incorporating flexibility into blended environments, while the strong face-to-face factor and students' preference for offline learning suggest that interaction and instructional clarity remain central to creating an effective learning climate. Similarly, the qualitative findings relating to difficulties in understanding materials, delayed feedback, and reduced engagement in online settings point to challenges in facilitating learning processes and stimulating meaningful interaction. Taken together, the factor structure indicates that these design dimensions are not yet fully integrated across learning modalities. As a result, students appear to evaluate each learning mode independently based on the extent to which it satisfies their needs for flexibility, interaction, instructional support, and learning effectiveness.

A central finding of this study is the divergence between students' learning preferences and their actual participation patterns. While face-to-face learning was overwhelmingly preferred, asynchronous LMS-based learning recorded the highest levels of attendance. This apparent contradiction suggests that learning behavior is driven less by perceived pedagogical effectiveness and more by structural flexibility. From the perspective of self-regulated learning (SRL), this result can be interpreted as evidence that students gravitate toward environments that allow them to control time, pace, and engagement, even when such environments are not considered optimal for understanding. In this sense, flexibility functions as a behavioral driver, shaping participation independently of perceived instructional quality.

At the same time, the continued preference for face-to-face learning highlights the importance of interaction and instructional clarity, which are often less developed in online environments. This finding is consistent with the Community of Inquiry (CoI) framework, which emphasizes the role of teaching presence, social presence, and cognitive presence in supporting meaningful learning. The perceived superiority of face-to-face instruction in this study suggests that online components may not yet provide comparable levels of immediacy, feedback, and engagement, particularly for novice learners who are still adapting to blended environments.

The qualitative findings further reinforce this interpretation. Students frequently reported difficulties in understanding material in online settings, along with reduced opportunities for interaction and delayed feedback. These issues can be interpreted through the lens of cognitive load theory, which highlights the limitations of working memory and the importance of well-designed instructional structures. When online

learning environments lack clarity and coherence, they may impose additional cognitive demands on students, leading to confusion, fatigue, and reduced comprehension. This is particularly relevant in blended learning contexts, where students are required to navigate multiple modalities with varying levels of guidance and structure.

Another important dimension that emerged from the findings is the role of self-regulation and psychological demands. Students reported challenges related to motivation, concentration, and time management, indicating that blended learning environments place significant responsibility on learners to manage their own engagement. While flexibility enables autonomy, it also increases the need for effective self-regulation strategies. However, not all students possess these skills to the same extent, which may explain the mixed perceptions of effectiveness observed in the results.

The results of the Exploratory Factor Analysis provide further support for interpreting blended learning as a fragmented educational experience. The identification of distinct factors corresponding to different learning modalities suggests that students evaluate each mode based on its specific characteristics, rather than integrating them into a single conceptual framework. The emergence of flexibility as an independent factor reinforces its central role in shaping students' engagement and perception. Additionally, the presence of items with high uniqueness related to cognitive fatigue and concentration difficulties suggests that important psychological dimensions—such as cognitive load and self-regulation capacity—are not fully captured within the current structure and warrant further investigation.

Taken together, these findings suggest that the effectiveness of blended learning cannot be understood solely in terms of technological integration or modality design. Instead, it depends on the alignment between flexibility, instructional quality, and student capability. When flexibility is not supported by clear instructional design and adequate interaction, it may lead to fragmented learning experiences and increased cognitive demands.

This study therefore contributes to the literature by proposing that blended learning should be conceptualized as a pedagogical-psychological ecosystem, rather than a simple combination of delivery modes. Within this ecosystem, different modalities serve distinct roles, and their effectiveness depends on how well they are integrated with students' cognitive processes and self-regulation capacities. Future implementations of blended learning should move beyond structural combinations of modalities and focus on designing coherent, interaction-rich, and cognitively manageable learning environments.

CONCLUSION

Fundamental Finding: This study demonstrates that blended learning is perceived not as a unified instructional model, but as a complex and multidimensional learning ecosystem. Across the findings, flexibility consistently emerges as the central organizing construct shaping student engagement. It functions not only as a practical affordance that enables access and participation, but also as a psychological driver that supports autonomy, time management, and control over the learning process.

Despite high levels of participation across all learning modes, students continue to show a strong preference for face-to-face instruction, highlighting the enduring importance of direct interaction, immediacy, and instructional clarity. Furthermore, the integration of quantitative and qualitative evidence indicates that blended learning is experienced as functionally and cognitively segmented, with each modality – face-to-face, synchronous online, asynchronous, and MOOC-based learning – associated with distinct pedagogical roles and learning experiences. At the same time, persistent challenges, particularly related to technical reliability, interaction quality, instructional design, and self-regulation demands, point to uneven effectiveness in current implementations.

Implications : These findings suggest that the effectiveness of blended learning depends on the alignment between technological infrastructure, pedagogical design, and learner support systems. While flexibility is a key strength, it must be intentionally structured to prevent increased cognitive load and fragmented learning experiences. Accordingly, higher education institutions should prioritize integrated instructional design, in which each learning mode is clearly differentiated and pedagogically purposeful rather than simply combined. Equally important is the development of lecturers' digital pedagogical competencies, particularly in facilitating interaction, providing timely feedback, and designing engaging online learning experiences. In addition, institutional efforts should focus on strengthening student self-regulation, motivation, and adaptive learning strategies, supported by reliable digital infrastructure. Without such coordinated efforts, blended learning risks remaining a procedural combination of modalities rather than evolving into a genuinely transformative approach to teaching and learning.

In addition, institutions should strengthen students' self-regulation, motivation, and adaptive learning skills. This effort should be supported by reliable digital infrastructure. Universities can introduce structured support programs, such as orientation workshops on time management and goal setting. They can also provide academic coaching or mentoring sessions throughout the semester. Learning analytics dashboards may help students track their progress and identify areas that need improvement. Early-alert systems can also be used to detect signs of disengagement and provide timely support. Furthermore, LMS platforms can include reflective journals, weekly learning plans, and self-monitoring checklists. These simple tools encourage students to reflect on their learning, manage their study routines, and gradually develop stronger self-regulation habits.

Limitations: Several limitations should be acknowledged. First, the study is situated within a single institutional context with a relatively homogeneous sample, which may limit the generalizability of the findings. Second, the reliance on self-reported data introduces the possibility of response bias, particularly in relation to perceived effectiveness and engagement. Finally, although the exploratory factor analysis provides useful insights into the latent structure of student perceptions, the absence of confirmatory validation limits the robustness and statistical generalizability of the proposed model.

Further Research: Future research should extend this study by employing larger and more diverse samples, as well as applying confirmatory factor analysis (CFA) or other structural modeling approaches to validate the identified factor structure. Further investigation into the roles of cognitive load, self-regulation, and motivation in blended

learning environments would provide deeper insight into how different instructional designs influence student experience and performance.

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