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ORIGINAL RESEARCH

Blended Learning in Bachelor's Nursing Education: Exploring Student Experiences, Satisfaction, and Knowledge

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Background: Blended learning merges in-person instruction with online education, offering flexible and individualized learning experiences. This approach is especially valuable in nursing education, where connecting theoretical knowledge with practical application is crucial.

Objective: The study aims to investigate nursing students' experiences and satisfaction levels regarding blended learning in a Clinical Nutrition Course targeted at third-year nursing students while comparing the knowledge outcomes of blended learning and traditional learning groups.

Methods: A cross-sectional study design was utilized to evaluate the experiences of 307 female nursing students through the Web-based Learning Environment Instrument (WEBLEI). Data were collected online using a 5-point Likert scale and analyzed with descriptive statistics. Moreover, academic performance between the blended learning group (2024–2025) and the traditional group (2023–2024) was compared using independent t-tests.

Results: Students reported a high level of satisfaction with blended learning, evident from the overall WEBLEI scores. Scores for Access (4.48), Interaction (4.40), Response (4.59), and Results (4.64) indicated favorable views regarding flexibility, engagement, and knowledge gain. The blended learning group exhibited significantly better academic performance (Total Score: 94.39 ± 4.78) compared to the traditional group (89.21 ± 5.39; $p < 0.001$).

Conclusion: Blended learning significantly improves both student satisfaction and academic performance in nursing education. Enhancing peer interaction and incorporating additional synchronous activities could further enhance the blended learning approach.

Keywords: blended learning, nursing education, student satisfaction, academic performance

Introduction

Blended learning (BL) is a pedagogical approach that integrates traditional face-to-face instruction with customized online learning modalities and has become increasingly popular in higher education, particularly in health-related fields.[1,2] By merging the advantages of face-to-face interaction with the accessibility and ease of online materials, BL can significantly boost student engagement, enhance academic outcomes, and improve retention in intricate fields such as nursing.[3,4] Studies have shown that online learning, a key aspect of BL, provides advantages such as the encouragement of collaborative learning through online platforms and the opportunity for self-paced learning.[2,5,6] These benefits align with higher education institutions' objectives to accommodate various learning styles and enhance educational equity.[3,7]

Studies also indicate that BL may lead to higher levels of student satisfaction and academic success, as it fosters active involvement and cultivates critical thinking.[8] In alignment with institutional objectives to nurture distinctive and adaptable learning environments, a blended format was employed to redesign a third-year Clinical Nutrition Course within the Bachelor of Science in Nursing program, which had previously been delivered as a traditional face-to-face learning experience.

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Evidence from research concerning health professions illustrates that BL can lead to comparable or enhanced academic performance, especially in clinical education.[1] Additionally, BL bridges the gap between theoretical learning and practical application in healthcare settings, equipping students with the tools to succeed in both their academic and clinical training.[9–11] This is vital for nursing students, as their education relies heavily on theoretical knowledge and practical application.

Despite considerable evidence supporting the advantages of BL in general education, its use in nursing education is still not thoroughly investigated, particularly regarding student satisfaction, engagement, and knowledge retention. A recent systematic review emphasized the necessity for further research to enhance the evaluation of BL in nursing education.[3,7]

Numerous nursing programs continue to depend predominantly on traditional face-to-face classroom teaching methods, potentially limiting innovation in curriculum design.[12,13] Existing studies, including a meta-analysis conducted by Li et al (2019), revealed a scarcity of studies contrasting BL with conventional approaches. Given the rapid advancements in educational technologies and the increasing demand for adaptable learning models, there is a need for high-quality research assessing the effectiveness of BL in undergraduate nursing programs.[14,15] This study intends to fill this gap by investigating the experiences and satisfaction levels of nursing students enrolled in a newly implemented blended Clinical Nutrition Course. The course was redesigned in 2024 to incorporate synchronous theoretical lectures and asynchronous and interactive digital materials on Blackboard. This study uses a cross-sectional design to capture students' perceptions and academic outcomes. Such studies provide valuable insights into current trends within a specific cohort, especially in the context of rapidly evolving educational methods like BL, where prompt student feedback can shape future courses and policy decisions.

The growing interest in online education, especially during the COVID-19 pandemic, has increased the focus on e-learning in health education. In Saudi Arabia, the Vision 2030 initiative highlights e-learning as a crucial part of educational reforms, leading to significant investments in online resources, which prepare future generations for a digital workforce and improve academic quality. The current study aligns with Saudi Arabia's goals for digital transformation in higher education.

This study aims to explore the experience and satisfaction levels of undergraduate nursing students enrolled in a newly implemented blended Clinical Nutrition Course in 2024–2025. Additionally, it intends to assess students' knowledge by comparing their academic performance with students who took the same course in a traditional classroom setting in 2023–2024 with the same instructor.

Subjects and Methods

Study Design

The study employed a cross-sectional design to investigate the experiences, satisfaction levels, and knowledge outcomes of third-year nursing students enrolled in a Clinical Nutrition Course that incorporated a BL approach during the 2024–2025 academic year.

Course Development and Theoretical Framework

To ensure effective course implementation, the educator participated in specialized training focused on BL methods, which provided valuable insights into integrating digital and face-to-face learning components, as well as the course development process. The training also highlighted the significance of choosing suitable online platforms and evidence-based instructional strategies to fulfill the learning requirements of nursing students. The Clinical Nutrition Course was redesigned to integrate BL principles, merging live online lectures with individualized asynchronous tasks. The course was designed using a constructivist learning theory, which highlights the importance of active learning and the development of knowledge through engagement with content, peers, and instructors. The course design also incorporated cognitive load theory, which aims to manage students' cognitive demands by balancing the difficulty of learning materials and offering support to help students effectively process and retain new information. Furthermore, the course applied the community of inquiry framework, which aims to create an interactive learning atmosphere that promotes cognitive, social, and teaching presence.

Blended Learning Format

The course structure featured a combination of synchronous lectures (two hours per week) conducted via Blackboard, complemented by self-paced asynchronous activities. These activities were designed to boost student engagement and facilitate more tailored learning experiences. Features on Blackboard, such as discussion forums, quizzes, case studies, self-assessments, and assignments, were integrated to strengthen learning outcomes and encourage collaboration among students. Regular feedback on students' progress was offered through the Blackboard platform, where they received formative assessments, peer reviews, and comments from instructors. This feedback was intended to support students throughout the learning journey and enhance their comprehension of the course material.

Participants

During the academic year of 2024–2025, a cross-sectional study was carried out with a non-probabilistic convenience sample involving students aged 19–24 in their third year of a nursing baccalaureate program after they finished the Clinical Nutrition Course and received their grades in the formative and summative academic performance. Students from other academic years were excluded from the study. Approximately 307 out of 327 students consented to participate in the study. The research was carried out following the guidelines set by the university, and faculty management granted permission for the lawful collection of student data. The sample size was based on the total number of students enrolled in the course, and participation was on a voluntary basis.

Data Collection Instrument and Procedure

A self-administered questionnaire was distributed to the students using Google Forms for the academic year 2024–2025. The students' experience and satisfaction were assessed using the Web-based Learning Environment Instrument (WEBLEI), a validated tool previously utilized in research regarding online and BL settings.[16] This instrument consists of 32 statements categorized into four scales: Access, Interaction, Response, and Results.

The prior studies established the reliability and validity of the WEBLEI instrument. The survey was designed to incorporate questions about using Blackboard as the main learning platform to align with the study context. To ensure the suitability and clarity of the questionnaire for the study environment, a pilot test was performed with a small group of students who shared similar academic backgrounds but were not included in the main study sample.

Students completed the questionnaire, responding on a 5-point Likert. Participation was optional, and measures were taken to maintain anonymity and confidentiality.

To enhance clarity and relevance to the study while reducing response bias, some items in the questionnaire (Q20, 24, and 26) were reverse coded during data analysis to ensure consistency in interpreting scores, with higher values consistently representing more favorable responses. These adjustments ensure that the study remains aligned and consistent with the relevant context and the overall construct being assessed while also preserving content validity.

Knowledge Assessment

To evaluate students' knowledge outcomes, a comparison was made between the BL group (2024–2025) and a traditional face-to-face classroom group (2023–2024). Knowledge outcomes were evaluated through continuous assessment scores, final exam results, and overall knowledge scores across semesters. Academic performance served as an indicator of knowledge acquisition and retention, and statistical analyses were conducted to compare the results between the two groups. Additionally, at the conclusion of each semester, students conduct a summative evaluation of the courses via a university survey.

Ethical Considerations

Ethical approval was obtained from the Princess Nourah bint Abdulrahman University Review Board (Approval No: [24–0959]). Informed consent was secured from all participants after thoroughly explaining the study's aims, methods, and the voluntary nature of their involvement. The consent procedure was meticulously designed to reduce any potential influence on the students' responses. Moreover, participants were informed of their right to withdraw at any point.

Data Analysis

Descriptive statistics (means, standard deviations, and percentages) summarized participant responses. The data analysis comprised an evaluation of students' satisfaction levels and their perceptions of the BL course format. Independent t-tests were performed to compare the knowledge outcomes between the BL and traditional face-to-face learning. Statistical significance was set at $p \leq 0.05$.

This methodology is intended to produce significant findings that could significantly enhance the understanding of the effectiveness of BL in nursing education, ultimately guiding future curriculum development and teaching strategies.

Results

WEBLEI Outcomes

Data were categorized and analyzed across four scales: Access, Interaction, Response, and Results. The results indicated a high overall satisfaction level, with mean scores reflecting positive experiences with BL. The data for the four categories are outlined in Table 1. The four scales' mean scores (4.48, 4.40, 4.59, and 4.64) demonstrate favorable responses to most statements. The overall mean is 4.53, suggesting a comparatively high mean across the 32 statements.

Table 2 shows in-depth responses of 307 nursing students to a BL program, concentrating on four scales: Access, Interaction, Response, and Results.

Scale I: Access

Students expressed significant appreciation for the program's accessibility and flexibility, highlighted by the high ratings for items like accessing activities at convenient times (Q1: Mean = 4.70) and the availability of materials at suitable locations (Q2: Mean = 4.71). The ability to work at one's own pace (Q4: Mean = 4.32) and deciding how and when to learn (Q5: Mean = 4.17; Q6: Mean = 4.05) received slightly lower scores, indicating varied preferences for self-directed learning. The high scores reflect the program's effectiveness in providing widely available and flexible resources, essential for nursing students balancing their academic and clinical duties.

Scale II: Interaction

Interaction with instructors and the Blackboard platform is highly rated, with scores for autonomy to ask questions (Q11: Mean = 4.74) and regular interaction with the platform (Q15: Mean = 4.76) being notably high. Meanwhile, aspects like "online community with students" (Q16: Mean = 4.45) and "prompt student responses" (Q13: Mean = 4.16) received comparatively lower scores, suggesting opportunities for enhancing peer-to-peer interaction. Interaction remains a strong program component, especially with instructors and resources. Improving student-to-student interaction and response times could create a more integrated learning community.

Scale III: Response

High levels of satisfaction and engagement are evident, with items such as "sense of satisfaction and achievement" (Q18: Mean = 4.70) and "interest throughout the course" (Q23: Mean = 4.75) receiving high scores. Nonetheless, "Blackboard is no

Table 1 Descriptive Statistics of WEBLEI Scales (n = 307, 2025)
Blended Learning Satisfaction and Experience

Scale	Number of Items	Mean	SD
Scale I: Access	8	4.48	0.51
Scale II: Interaction	8	4.40	0.52
Scale III: Response	8	4.59	0.52
Scale IV: Results	8	4.64	0.46
Overall	32	4.53	0.41

Abbreviation: SD, Standard deviation.

Table 2 Detailed Responses of Nursing Students to the WEBLEI Questionnaire (n = 307, 2025) Blended Learning Satisfaction and Experience

Scale	Item Statement	Q#	Mean	SD.
Access	I can access the learning activities at times convenient to me	1	4.70	0.58
	The Blackboard material is available at locations suitable for me	2	4.71	0.55
	I can use the time saved in travelling and on campus class attendance for study and other commitments	3	4.65	0.61
	I am allowed to work at my own pace to achieve learning objectives	4	4.32	0.91
	I decide how much I want to learn in a given period	5	4.17	1.01
	I decide when I want to learn	6	4.05	1.05
	The flexibility allows me to meet my learning goals	7	4.57	0.72
	I prefer online learning rather than real-world classroom learning from a lecturer	8	4.67	0.63
Interaction	I communicate with other students in this subject electronically	9	4.62	0.68
	In this learning environment, I have to be self-disciplined in order to learn	10	4.45	0.81
	I have the autonomy to ask my instructor what I do not understand	11	4.74	0.59
	I have the autonomy to ask other students what I do not understand	12	4.23	0.89
	Other students respond promptly to my queries	13	4.16	0.89
	I would find it difficult to study on this course without regular interaction with the Blackboard resources	14	3.79	1.35
	I regularly interact with Blackboard	15	4.76	0.59
	I felt there was an "online community" with other students on the course	16	4.45	1.03
Response	This mode of learning enables me to interact with other students and the instructor asynchronously	17	4.70	0.72
	I felt a sense of satisfaction and achievement about this learning environment	18	4.70	0.63
	I enjoy learning in this environment	19	4.72	0.68
	Blackboard is no substitute for on-campus classes	20	4.12	1.22
	It is easy to organize a group for a project†	21	4.70	0.67
	It is easy to work collaboratively with other students involved in a group project	22	4.72	0.64
	The Blackboard-based learning environment held my interest throughout my course of study	23	4.75	0.61
	I felt a sense of boredom with the online material towards the end of my course of study†	24	4.31	1.26
Results	Each Blackboard lesson is setup clearly with learning objectives clearly stated	25	4.81	0.53
	Links to Blackboard are no substitute for printed references or articles†	26	3.98	1.22
	The structure keeps me focused on what is to be learned.	27	4.73	0.60
	I am happy to download lecture and exercise material from Blackboard	28	4.65	0.70
	I can see the connection between the Blackboard course and the campus course	29	4.71	0.63
	The subject content is appropriate for delivery on the Blackboard.	30	4.75	0.59
	The presentation of the subject content is clear.	31	4.75	0.60
	Blackboard resources plus the classroom teaching enhance my learning	32	4.75	0.59

Abbreviation: SD, Standard deviation; †Reverse-coded during analysis.

substitute for on-campus classes" (Q20: Mean = 4.12) and "I felt a sense of boredom with the online material towards the end of my course of study" (Q: 24 Mean = 4.31) garnered lower reverse-coded scores, highlighting the necessity of the blended model over entirely online learning. The high levels of engagement and satisfaction underscore the program's effectiveness.

Scale IV: Results

Students gave high ratings to clarity and relevance, with items such as "clear learning objectives" (Q25: Mean = 4.81) and "enhanced learning from Blackboard and classroom teaching" (Q32: Mean = 4.75) receiving the top scores. The program exhibits excellence in delivering content as students acknowledge the alignment of Blackboard resources with course goals.

Table 3 illustrates particular areas of student experience and satisfaction that evaluate essential elements of students' experiences, satisfaction, and perceptions within the BL program. The appropriateness and clarity of Blackboard content received a high mean score of 4.75 (Item 32), underscoring the platform's effectiveness for delivering nursing course materials and confirming the success of the BL design. Conversely, the preference for printed materials compared to online links was lower, with a mean score of 3.98 (Item 26), suggesting a possibility for improvement. These results indicate that while Blackboard effectively facilitates learning, some aspects of content delivery may need enhancement to cater to all student preferences.

Comparison of Satisfaction Levels

Student satisfaction was examined within the group that participated in the BL format using the WEBLEI scale. As illustrated in Table 3, students expressed high satisfaction levels across all four criteria—Access, Interaction, Response, and Results. The overall average satisfaction score was 4.53, indicating strong approval of the BL method. The Access criterion earned a score of 4.48, demonstrating students' appreciation for the flexibility and convenience offered by the online components. Interaction with instructors was also rated positively, receiving a score of 4.40; however, peer-to-peer engagement was recognized as an area needing further improvement. The Response metric, which captures feelings of engagement and achievement, scored 4.49. Finally, the Results category received a score of 4.64, showing that students recognized significant gains in knowledge and skills through the BL approach.

Comparative Knowledge Analysis

Table 4 presents a comparative analysis of academic performance between students enrolled in traditional face-to-face learning (2023–2024, n = 229) and those in the BL format (2024–2025, n = 327). The BL group attained a higher average grade (94.39) than the traditional learning group (89.21). This indicates that the BL method had a consistent and favorable effect on student performance. In Continuous Assessment, the BL group recorded a mean score of 57.52, while the traditional group scored 56.29. For the Final Exam, the BL group obtained a mean of 36.88, significantly surpassing the traditional group's mean of 32.91. The Total Knowledge Score for the BL group was 94.39, compared to 89.21 for the traditional group. The p-value (<0.001) indicates that the BL approach significantly improves student academic performance. These results reinforce the effectiveness of BL as an educational strategy in nursing programs, resulting in enhanced knowledge retention and greater student satisfaction.

Table 3 Selected Item Distribution (n = 307, 2025) Student Perceptions in the Blended Learning Environment

Selected Item Statement	Q#	Mean	SD
I prefer online learning over classroom learning	8	4.67	0.63
Blackboard is no substitute for on-campus classes†	20	4.12	1.22
Links to Blackboard are no substitute for printed references†	26	3.98	1.22
I see the connection between Blackboard and campus learning	29	4.71	0.63
Blackboard and classroom teaching enhance my learning	32	4.75	0.59

Abbreviation: SDSD, Standard deviation; †Reverse-coded during analysis.

Table 4 Academic Performance: Traditional vs Blended Learning

	Traditional 2023	Blended 2024	t	p
Continuous Assessment	**(n = 229)**	**(n = 327)**		
Min – Max	46.30–60.0	45.0–60.0	5.69*	<0.001*
Mean ± SD	56.29 ± 2.66	57.52 ± 2.28		
Median (IQR)	57.0 (55.0–58.30)	58.0 (56.50–59.30)		
Final Exam	**(n = 229)**	**(n = 327)**		
Min – Max	17.30–40.0	12.70–40.0	12.62*	<0.001*
Mean ± SD	32.91 ± 3.78	36.88 ± 3.44		
Median (IQR)	33.30 (30.0–36.0)	38.0 (36.0–38.70)		
Total	**(n = 229)**	**(n = 327)**		
Min – Max	70–98	67–100	11.68*	<0.001*
Mean ± SD	89.21 ± 5.39	94.39 ± 4.78		
Median (IQR)	90 (86–93)	95 (92–97)		

Note: Final exam scores are graded out of 40 marks, and continuous assessment scores are graded out of 60. Total scores are out of 100.* Asterisk (*) indicates statistical significance at $p < 0.001$.
Abbreviations: SD, Standard deviation; IQR, Interquartile range; t, Student's *t*-test; Statistically significant at $p \leq 0.05$.

Discussion

The research highlights the potential of BL as a transformative method in nursing education and offers evidence for its wider implementation in undergraduate nursing programs. The results indicate that BL, which combines traditional face-to-face teaching with online elements through Blackboard, provides multiple benefits regarding student satisfaction and academic achievement. These results contribute to the growing body of literature supporting hybrid educational models in nursing, emphasizing the increasing importance of flexibility and accessibility for students balancing academic and clinical responsibilities.[4] The author's participation in a BL training course demonstrated successful methods for integrating online and in-person classroom learning, which were evident in the experiences and satisfaction levels expressed by students in this study. These observations reinforce the recommendation for nursing education institutions to invest in training programs for educators and strong digital platforms to improve the effectiveness of BL methods. The high WEBLEI scale scores (Access, Interaction, Response, and Results) reveal that students found the BL environment to be accessible and engaging. Students especially valued the flexibility to learn at their own pace and the convenience of accessing Blackboard materials. This result aligns with existing literature that suggests the flexibility of BL fosters self-regulation and accommodates various learning styles.[15,17]

The WEBLEI scale scores show high values: Access (4.48), Interaction (4.40), Response (4.49), and Results (4.64), reflecting a positive response to the BL format among students. The mean score of 4.48 on Scale I "Access" indicates that students generally agree that they can reasonably access the online learning materials within their overall BL environment. They particularly valued the flexibility and convenience of accessing materials at their own pace, reinforcing the results of McCutcheon et al (2018), who found that nursing students appreciate the freedom to control their own learning pace and environment.[8] The Blackboard learning platform allows them the autonomy to decide when and where to access learning materials.

An item in the Access section explored students' preference for online learning over traditional classroom methods. The elevated mean score suggests that students typically prefer online learning within the BL framework. Similarly, a systematic review conducted by Rowe et al highlighted that BL enhances students' capacity to manage their studies alongside personal commitments.[18]

The mean score of Scale II (Interaction) is 4.40, indicating that students felt they could engage and communicate with their peers in the online environment. Elements of interaction, such as having the autonomy to communicate with instructors (4.74) and frequent utilization of Blackboard (4.76), also received high scores. The relatively lower scores for "responses from other students" and "sense of online community" highlight that nurturing peer engagement continues to be challenging in online environments. This is consistent with previous research, like the work of Berga et al (2021), which observed that while BL promotes interaction between instructors and students, it frequently has difficulty establishing a robust peer community.[19] Implementing structured group activities, like group projects or peer-review tasks, may help mitigate this issue. Moreover, encouraging active involvement in discussion boards and providing prompt feedback from instructors can enhance the sense of community and interaction within the course. These strategies have demonstrated effectiveness in other BL models, and previous studies have shown positive correlations between learner motivation and metacognitive skills and the frequency of online interactions in BL contexts.[20,21]

Results from Scale III "Response" (4.59) demonstrated high levels of satisfaction and engagement among students in the BL setting. Students reported enjoyment in the learning experience, as evidenced by a high mean score (4.72) for the statement, "I enjoy learning in this environment." This reflects an overall readiness to engage with online course materials and satisfaction with the quality of the Blackboard platform and resources provided. This positive evaluation of Blackboard enjoyment suggests that students are not resistant or dissatisfied with online learning environments. This reflects the conclusions of López-Pérez et al, who found that BL environments enhance learner satisfaction and motivation by employing various instructional strategies.[22] This result is encouraging, given that students can access a diverse range of high-quality resources.

However, the reverse-coded rating of 4.12 for the statement "Blackboard is no substitute for on-campus classes" underscores a few students' hesitations about completely replacing traditional classroom instruction with online education. Previous research has indicated that while online education fosters independence, it may lack the immediate and dynamic interactions found in face-to-face classroom instruction.[23] This perspective is reflected in the results of Means et al, which indicate that although BL enhances educational results, it should not entirely replace face-to-face interactions, particularly in practice-based fields such as nursing.[24] The gap was addressed in the Clinical Nutrition Course by integrating synchronous components, such as live discussions or virtual office hours, which further improved student experiences. The reverse-coded score of 4.31 for "I felt a sense of boredom with the Blackboard material towards the end of my course of study" suggests that while most students did not experience boredom, some faced engagement difficulties as the course progressed. This highlights the importance of maintaining an engaging and varied combination of Blackboard and face-to-face elements to sustain student motivation throughout the course.

With a mean score of 4.64, the "Results" scale received the highest ratings overall, suggesting that students believed the BL approach successfully met its educational goals. The statement "Each Blackboard lesson is set up clearly with learning objectives clearly stated" received the highest score on this scale at 4.81, showcasing the platform's effective organization and alignment with course objectives. Students also valued the combination of online and classroom learning, as seen in the statement, "Blackboard resources plus classroom teaching enhances my learning" with a score of 4.75. This highlights the significance of a balanced strategy where online materials augment face-to-face instruction. These results are consistent with a meta-analysis, which indicated that BL notably enhances knowledge retention and its application in clinical environments.[2] Lower reverse-coded ratings were observed for "Links to Blackboard are no substitute for printed references or articles" at 3.98, indicating that some students preferred traditional materials and digital resources. The preference for printed resources observed in this study corresponds with findings from Regmi and Jones (2020), which emphasize that certain students still appreciate traditional learning materials, indicating a necessity for blended models that accommodate various learning preferences.[25] Nevertheless, the high mean score of 4.71 for "I can see the connection between the Blackboard course and the campus course" reflects that students acknowledged the effective integration of theoretical and practical components across different learning formats.

This study is consistent with other research that explored how student perceptions in BL courses correlate with their achievements in the course and found that students reported high levels of satisfaction with this approach.[26–28] The findings of this study reinforce earlier research highlighting access, convenience, and flexibility as crucial factors in learning for many students.[17,20,29] Studies report high ratings for accessibility, as students value the ability to learn at

their own pace and manage their schedules effectively. This approach also promotes self-regulation and caters to various learning styles.[10,19] Nevertheless, the current study identified a high level of engagement and satisfaction with interactive components, likely due to the incorporation of live discussions and collaborative tasks that were less prioritized in the Berga et al study. Challenges related to peer interaction were noted, which resulted in lower ratings for this aspect. This was attributed to the course design and potential gaps in student motivation. This study found that while interaction with instructors received high ratings, engagement among peers needed improvement. Implementing more structured group activities and synchronous sessions may help address this shortcoming.[19]

When comparing the experiential and knowledge outcomes of the BL environment to traditional face-to-face classroom teaching (2023–2024), the BL group (2024–2025) attained a higher average grade (94.39 ± 4.78) than the traditional learning group (89.21 ± 5.39). The results from this study align with the literature, indicating that student performance in the BL environment is comparable to that achieved in traditional classroom settings.[4,13,28] The notable enhancement in academic performance among the BL group versus the traditional group illustrates that this method effectively supports knowledge retention. The elevated mean scores and reduced variability in the blended group imply that the course structure and the combination of online and in-person elements offered a more uniform learning experience. The findings of this research resonate with a study conducted in Canada. (2021), which also examined BL in undergraduate nursing education. Both studies emphasize the benefits of BL in fostering flexibility and student satisfaction. However, while the current research observed a significant increase in knowledge outcomes for the BL group relative to traditional methods, Berga et al found no substantial differences in knowledge between the BL and face-to-face classroom groups.[9,11,19] This variation could be due to differences in course design, as this study utilized a full-semester BL format with synchronous and asynchronous elements, whereas Berga et al included fewer face-to-face sessions paired with asynchronous modules. The significance of course design in influencing BL outcomes has been highlighted in various reviews, such as the research conducted by O'Flaherty and Phillips, underscoring the necessity for deliberate and engaging course planning.[30]

Combining Blackboard modules with face-to-face sessions seems to foster a well-rounded learning environment catering to different student needs. These findings support the idea that BL can bridge the gap between theoretical concepts and practical application, which is vital in nursing education. The effectiveness of BL lies in its capacity to deliver content through various methods, accommodating diverse learning preferences and enabling students to review challenging materials. This multimodal strategy is especially pertinent in nursing education, where linking theoretical knowledge to practice is essential for cultivating clinical reasoning and critical thinking abilities.

A meta-analysis performed in China aimed to examine how BL impacts nursing students in terms of their knowledge, skills, and satisfaction. The findings indicated that BL can enhance both knowledge retention and the application of practical skills within health fields.[15] The results of this research are especially significant within the framework of Saudi Arabia's Vision 2030, which advocates for digital transformation and educational modernization. This study's successful application of BL illustrates how innovative teaching methods can align with national objectives to prepare students for future professional settings. Furthermore, this approach mirrors global trends in nursing education, where the incorporation of technology is increasingly acknowledged as crucial for nurturing independent learners.

Limitations

This research provides valuable insights into BL within a single institution's context of a specific nursing course. However, concentrating on a single setting may restrict the broader applicability of the results to other institutions. Although self-reported perceptions yielded valuable insights into student experiences, they might not encompass the complete spectrum of learning outcomes. The study was also confined to a particular time period, leaving long-term knowledge retention and clinical application unexamined. Future studies could expand on these findings by including additional institutions and assessing outcomes over a longer duration to enhance nursing education.

Conclusion

This study underscores the notable advantages of adopting a BL approach in nursing education. Students expressed high satisfaction, engagement, and academic success, indicating that BL is an effective and viable approach.

As a cross-sectional study conducted in a single institution, the findings may not be widely generalizable to different settings. Nevertheless, this study adds to the increasing evidence indicating that BL can be effective when thoughtfully implemented. These results provide important insights for educators and policymakers aiming to improve nursing education through innovative teaching methods. It is crucial to tackle the perceived limitations of online components to realize their potential and guarantee a comprehensive learning experience.

Further research should aim to broaden the investigation to encompass additional courses and institutions. Additionally, examining the impact of synchronous online activities and new technologies, such as virtual simulations and augmented reality, may further improve the effectiveness of BL in nursing education. By addressing the identified challenges and leveraging the strengths of the BL model, nursing programs can continue to evolve and equip graduates to meet the challenges of contemporary healthcare environments.

Data Sharing Statement

The data supporting this study's findings are available from the corresponding author upon request.

Informed Consent Statement

Informed consent was acquired from all participants. The study complies with the Declaration of Helsinki.

Institutional Review Board (IRB) Statement

The IRB has confirmed that this project poses minimal risk to the participants. Therefore, the study is considered an EXPEDITED IRB review.

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Disclosure

The author reports no potential conflicts of interest in this work.

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