

A CROSS-SECTIONAL ANALYSIS OF STUDENT PERCEPTIONS TOWARD FACE-TO-FACE AND BLENDED LEARNING EFFECTIVENESS IN APPLIED EXERCISE REHABILITATION COURSE BETWEEN FACULTY OF SPORTS SCIENCE AND RECREATION UiTM CAMPUSES

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ABSTRACT

This study examined differences in student perceptions of face-to-face (F2F) and blended learning (BL) effectiveness in Applied Exercise Rehabilitation courses across four Faculty of Sport Science and Recreation (FSR) Universiti Teknologi MARA (UiTM) campuses in Malaysia. A cross-sectional survey design was employed, with 212 undergraduate students completing a structured questionnaire, using a Likert scale, assessing perceived effectiveness in developing fundamental knowledge, clinical skills, and social competency, and learning enjoyment. Chi-square tests of independence with adjusted standardised residuals were conducted to identify campus-specific variations. Results revealed consistently positive F2F perceptions across all campuses, with significant differences observed for fundamental knowledge ($p=.004$) and social competency ($p=.025$). However, substantial campus variations emerged for BL perceptions across all domains ($p=.001$), with FSR UiTM Seremban demonstrating the most favourable perceptions and FSR UiTM Arau exhibiting the least favourable perceptions. Similar patterns were observed for learning enjoyment, where F2F classes received uniformly positive ratings while BL enjoyment differed significantly across campuses ($p=.001$). These findings suggest that campus-specific factors, including technological infrastructure and instructional design quality, significantly influence BL experiences in psychomotor-intensive disciplines. The study recommends that FSR UiTM Arau prioritise upgrading technological infrastructure and instructional design capacity, while adopting FSR Seremban BL implementation practices as a benchmark, alongside sustaining substantive F2F components across all campuses to preserve psychomotor skill development.

Keywords: *blended learning, face-to-face instruction, student perceptions, exercise rehabilitation, psychomotor learning, multi-campus education*

INTRODUCTION

The rapid transformation of higher education pedagogy has positioned blended learning as a dominant instructional approach in contemporary academic settings. Blended learning, which integrates traditional face-to-face instruction with online learning components, offers flexibility, accessibility, and opportunities for self-directed learning whilst maintaining the benefits of direct instructor-student interaction (Anthony

Jr et al., 2022; Garrison & Kanuka, 2004). The COVID-19 pandemic accelerated the adoption of blended and online learning modalities across educational institutions worldwide, compelling universities to rapidly transition from conventional classroom-based instruction to hybrid delivery formats (García-Morales et al., 2021; Watermeyer et al., 2021). This unprecedented shift fundamentally altered the educational landscape, with many institutions subsequently adopting blended learning as a permanent feature of their pedagogical approach rather than merely an emergency response (Singh et al., 2021).

Sports science programmes present distinct pedagogical considerations due to their inherent emphasis on psychomotor teaching and learning. Unlike purely theoretical disciplines, sports science education requires students to develop practical competencies encompassing motor skill execution, movement analysis, exercise technique demonstration, fitness assessment administration, and physical training methodology application (Emerick et al., 2021; Leech et al., 2022). Psychomotor learning in sports science involves the progressive acquisition of physical skills through observation, imitation, practice, and refinement under expert guidance, processes traditionally reliant on face-to-face instruction and immediate corrective feedback (Bilyeu et al., 2024). The integration of blended learning within sports science curricula therefore raises important questions regarding the effectiveness of online components in supporting psychomotor skill development alongside cognitive and affective learning domains.

Universiti Teknologi MARA (UiTM) represents the largest public university system in Malaysia, with multiple campuses distributed across the nation. The Faculty of Sport Science and Recreation (FSR) operates across several UiTM campuses, delivering programmes including Applied Exercise Rehabilitation to diverse student cohorts. These campuses vary in infrastructure, technological resources, faculty expertise, student demographics, and institutional culture, factors that may differentially influence the implementation and reception of BL approaches (Müller & Mildemberger, 2021). Students enrolled in the same programme at different campuses may experience variations in online platform accessibility, internet connectivity, learning management system utilisation, instructor technological proficiency, practical facility availability, and peer learning opportunities for psychomotor skill development.

Despite the widespread implementation of BL across UiTM campuses, limited research has examined whether student perceptions of this instructional approach differ systematically across campus locations. Such differences, if present, may reflect disparities in resource allocation, infrastructure development, faculty training, practical laboratory facilities, or local contextual factors that influence the quality of blended learning experiences. Identifying campus-specific variations in student perceptions can inform targeted interventions to enhance educational equity and optimise blended learning implementation across the multi-campus university system.

Therefore, the purpose of this study is to examine differences in student perceptions on the effectiveness between F2F and BL in Applied Exercise Rehabilitation course across FSR campuses of UiTM Malaysia, involving 212 undergraduate students. Two research questions guided through this investigation: (1) Do student perceptions of F2F and BL effectiveness in developing fundamental knowledge, clinical skills, and social competency differ significantly across FSR UiTM campuses? (2) Does learning enjoyment differ between F2F and BL modalities across campuses? It was hypothesised that BL perceptions would show greater inter-campus variability than F2F perceptions, while F2F perceptions would remain comparatively stable across locations. Findings are expected to provide evidence-based recommendations for improving BL implementation and ensuring consistent educational quality across all FSR UiTM campuses.

LITERATURE REVIEW

Face-to-face (F2F) instruction has long served as the foundational pedagogical approach in higher education, characterised by synchronous, physically co-located interactions that enable real-time dialogue, immediate feedback, and responsive adaptation to student learning needs (Garrison & Vaughan, 2008; Means et al., 2013). F2F instruction proves particularly effective in applied disciplines requiring psychomotor competency development, where direct observation, immediate corrective feedback, tactile cueing, and manual guidance accelerate motor learning (Bilyeu et al., 2024; Leech et al., 2022). However, the COVID-19 pandemic fundamentally disrupted traditional instructional delivery, forcing institutions

worldwide to rapidly adopt online and hybrid modalities as emergency measures (Watermeyer et al., 2021). This unprecedented disruption, rather than merely interrupting F2F instruction, accelerated pre-existing trends toward digital integration driven by advances in learning management systems, video conferencing platforms, multimedia content delivery, and mobile learning technologies (García-Morales et al., 2021). Post-pandemic, institutions recognised that returning exclusively to traditional F2F formats would forfeit the flexibility, accessibility, and technological infrastructure gains achieved during emergency remote teaching (Singh et al., 2021). Consequently, blended learning emerged as the preferred approach, combining F2F psychomotor learning advantages with the accessibility and self-paced learning opportunities afforded by online components (Müller & Mildner, 2021).

Yet this consensus is not without challenge. Several post-pandemic studies report that students in applied health and sport disciplines expressed lower satisfaction with BL formats precisely where psychomotor skill development was central to programme outcomes, citing reduced feedback quality, limited peer modelling opportunities, and instructor difficulty replicating tactile correction through digital media (Enoch et al., 2022; Finlay et al., 2022). Others, however, found that well-structured online pre-exposure to theoretical content actually improved psychomotor readiness when students arrived at F2F sessions, suggesting that BL outcomes are highly contingent on instructional design quality rather than modality per se (Bilyeu et al., 2024; Enoch et al., 2023). This contradiction remains unresolved in the literature and forms a central motivation for the current study.

In exercise and sports rehabilitation education, blended learning (BL) presents unique opportunities and challenges. Applied courses such as exercise rehabilitation require the integration of theoretical knowledge with practical skill acquisition, clinical reasoning, and hands-on competencies that traditionally necessitate physical presence and direct supervision (Bissett et al., 2021). Students must demonstrate proficiency in therapeutic exercise prescription, functional movement screening, manual therapy techniques, and client communication, competencies that demand extensive psychomotor practice and experiential learning (Enoch et al., 2023) (18). The effectiveness of blended learning in developing these psychomotor skills, clinical decision-making abilities, and professional competencies essential for rehabilitation practice remains a subject of ongoing investigation (Finlay et al., 2022; Wang et al., 2022). Recent post-pandemic evidence suggests that clinical and allied health programmes face particular difficulty translating psychomotor curricula into hybrid formats, with students consistently rating online components lower for skill development than for knowledge acquisition (Rossettini et al., 2021; Sáiz-Manzanares et al., 2020). This pattern indicates that modality preferences in rehabilitation education are outcome-specific, a distinction earlier reviews largely overlooked.

Student perceptions of BL significantly influence learning outcomes, engagement, satisfaction, and academic performance. Research consistently demonstrates that positive student perceptions correlate with enhanced motivation, deeper learning approaches, and improved course completion rates (ElSayad, 2024; Rasheed et al., 2020). Conversely, negative perceptions, often stemming from technological barriers, inadequate support systems, poor course design, or misalignment between student expectations and instructional delivery, may undermine learning effectiveness and student satisfaction (Rasheed et al., 2020). In psychomotor-intensive disciplines such as sports science and exercise rehabilitation, student perceptions may be particularly influenced by the perceived adequacy of practical skill development opportunities within blended learning formats. Understanding the factors that shape student perceptions of blended learning is therefore essential for optimising course design and pedagogical strategies.

Notably, the existing literature on BL perceptions in sport and health science education has predominantly examined single-institution cohorts, limiting the generalisability of findings. Multi-campus comparative studies remain scarce. Where institutional comparisons do appear, they tend to contrast different universities rather than campuses within the same university system sharing a common curriculum, faculty structure, and programme standards. This distinction matters, because variation within a single institution isolates campus-level factors, such as infrastructure, resource allocation, and local instructional culture, from confounds introduced by differences in curriculum design or programme philosophy. No study to date

has examined inter-campus variation in BL perceptions within a Malaysian public university system, representing a clear gap this study addresses.

Theoretically, this study draws on the Community of Inquiry (CoI) framework, which positions effective online and blended learning as the product of three interdependent presences: cognitive presence, the construction of meaning through sustained inquiry; social presence, the ability of participants to project themselves as real people within the learning community; and teaching presence, the design, facilitation, and direction of learning processes (Garrison et al., 1999; Zhang & Zhu, 2023). The CoI framework is well-suited to the present investigation because it foregrounds the relational and environmental conditions that shape learning quality, conditions likely to vary across campuses with differing technological infrastructure and instructional support (Martin et al., 2022). Campus-level disparities in teaching presence, specifically instructor readiness, platform quality, and design consistency, are hypothesised to drive the inter-campus BL perception differences this study investigates. This framework therefore provides the conceptual logic connecting the campus-level contextual factors identified above to the student perception outcomes measured in the research design.

METHODOLOGY

Research Design

This study employed a cross-sectional survey design to examine differences in student perceptions of F2F and BL in Applied Exercise Rehabilitation courses across multiple campuses of Universiti Teknologi MARA (UiTM) Malaysia. A quantitative approach was adopted to facilitate systematic comparison of student perceptions across campus locations and enable statistical analysis of between-group differences. This study received ethical approval from the UiTM Research Ethics Committee (FERC/04/2023(UG/MR/0186, UG/MR/0191, UG/MR/01888)) prior to data collection.

Participants and Setting

A total of 212 undergraduate students enrolled in Applied Exercise Rehabilitation courses within the Faculty of Sport Science and Recreation (FSR) participated in this study. Respondents were recruited from four FSR UiTM campuses: UiTM Shah Alam, UiTM Arau, UiTM Seremban, and UiTM Samarahan. These campuses were selected to represent geographical diversity across Peninsular and East Malaysia, encompassing the central, northern, and southern regions of Peninsular Malaysia as well as Sarawak.

The Applied Exercise Rehabilitation course was standardised across all four FSR UiTM campuses, with students receiving identical syllabus, learning materials, assessments, and learning outcomes irrespective of campus location. The course structure comprised 14 weeks of instruction delivered through two distinct phases differentiated solely by instructional modality. The initial seven weeks employed BL for theoretical content delivery, encompassing foundational chapters on principles of exercise rehabilitation, anatomy and physiology of injury, therapeutic modalities, and evidence-based rehabilitation practice through UFuture, UiTM institutional online learning management system. Online learning activities during this phase included pre-recorded lecture videos, assigned reading materials, topic-based discussion forums, and formative online quizzes designed to consolidate theoretical understanding prior to F2F sessions. Instructor involvement during the BL phase comprised feedback through discussion board monitoring, weekly content guidance postings, and consultation availability via the platform's messaging function, with synchronous elements conducted where campus infrastructure permitted. The remaining seven weeks utilised F2F instruction for hands-on practical content, including skill test assessments, therapeutic exercise prescription and demonstration, functional movement screening, and supervised client interaction requiring direct psychomotor skill development. This standardised course design ensured that content remained constant across all campuses and both instructional phases, with delivery mode serving as the sole distinguishing variable. Consequently, observed differences in student perceptions could be attributed to the instructional delivery approach rather than variations in course content, enabling valid comparison between BL and F2F instruction (Magill & Anderson, 2010). It is acknowledged, however, that whilst the course structure was standardised, campus-level variation in platform functionality, internet connectivity,

and instructor engagement during the online phase represents a contextual limitation that likely contributed to the inter-campus perceptual differences observed

Instrument

This study using a structured questionnaire adopted from Baczek et al. (2021), which was originally developed to evaluate student perceptions of online learning in medical education (Bączek et al., 2021). The questionnaire was adapted for the sports science and exercise rehabilitation context whilst maintaining the original framework properties. The questionnaire was administered in a bilingual format, presenting both English and Bahasa Malaysia versions of each item simultaneously within a single instrument. This approach was adopted given the bilingual competency of the student population, allowing respondents to reference both languages concurrently and reducing the risk of item misinterpretation without necessitating a formal forward-backward translation procedure. The instrument assessed eight outcome domains specific to the Applied Exercise Rehabilitation course. These domains included effectiveness between F2F and BL in increasing fundamental knowledge, clinical skills knowledge, and social competency encompassing adaptive behaviour, social competency. Additionally, the questionnaire further assessed about student enjoyment between F2F and BL classes.

Demographic variables collected included age, sex, ethnicity, education background and study campus location. Perception items on effectiveness were measured using a five-point Likert scale ranging from 1 (extremely ineffective) to 5 (extremely effective). The enjoyable items were also used a five-point Likert scale ranging from 1 (extremely unenjoyable) to 5 (extremely enjoyable). The questionnaire was available in both English and Malay language versions to accommodate participant language preferences. The Malay version was developed through forward-backward translation procedures to ensure linguistic equivalence.

Data Collection Procedures

Data collection was conducted during the academic semester following institutional ethical approval. Lecturer in charge of the course in campuses were contacted and briefed on study procedures and assisted with participant recruitment. Students who agreed to participate provided informed consent prior to completing the questionnaire. The questionnaire was self-reported and administered electronically via Google Forms to ensure standardised delivery across all campus locations. Participants completed the questionnaire independently in their own time within a two-week data collection window. Reminders were sent to encourage participation and maximise response rates. Completed responses were automatically recorded and stored securely with access restricted to authorised research personnel.

Data Analysis

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS) version 27.0. Descriptive statistics including means, standard deviations, frequencies, and percentages were calculated for demographic variables and perception scores. Normality of data distribution was assessed using Shapiro-Wilk tests and visual inspection of histograms. Chi-square tests of independence were selected as the primary analytical method because both variables were categorical in nature: campus constituted a nominal independent variable with four unordered groups, and student perception responses were treated as discrete categorical classifications. This renders ordinal regression and Mann-Whitney U tests analytically inappropriate for the research objectives of this study.

To examine differences in student perceptions on F2F and BL across the four campuses, chi-square tests of independence were conducted to determine whether significant difference existed between campus location. Where statistically significant chi-square results were obtained, adjusted standardised residuals were calculated to identify specific cells that reports the pairwise comparisons between campus groups (Agresti, 1996; Sharpe, 2015). Adjusted residuals exceeding ± 1.96 were interpreted as indicating statistically significant deviations from expected frequencies at the $p < 0.05$ level, while residuals exceeding ± 2.58 indicated significance at the $p < 0.01$ level (Haberman, 1973). This post-hoc approach enabled identification of which specific campuses differed significantly from one another regarding student perception patterns. Statistical significance was set at $p < 0.05$ for all analyses.

RESULT

Demographic of respondents

Table 1: Demographics of the respondents

		Total (n=212)	FSR Shah Alam (n=87)	FSR Samarahan (n=40)	FSR Seremban (n=37)	FSR Arau (n=48)	Sig.
Age	18-22	55	22	1	8	24	.001
	23-25	140	62	31	23	24	
	26-28	17	3	8	6	0	
Sex	Male	126	53	25	21	27	.908
	Female	86	34	15	16	21	
Ethnicity	Malay	169	75	18	35	41	.001
	Sarawakian	21	4	16	0	1	
	Sabahan	22	8	6	2	6	
Education background	STPM	103	47	18	17	21	.042
	Matriculation	38	20	3	9	6	
	Diploma	71	20	19	11	21	

Legend n=number, FSR=Faculty Sports and Recreation, Sig.= Significant, STPM= Malaysian Higher School Certification

Table 1 presents the demographic characteristics of 212 respondents across four UiTM campuses, with the largest proportion from UiTM Shah Alam (n=87, 41.0%), followed by UiTM Arau (n=48, 22.6%), UiTM Samarahan (n=40, 18.9%), and UiTM Seremban (n=37, 17.5%). The majority of respondents were aged 23-25 years (n=140, 66.0%), male (n=126, 59.4%), Malay ethnicity (n=169, 79.7%), and entered university through STPM qualification (n=103, 48.6%). Chi-square analysis revealed significant differences across campuses for age (p=.001), ethnicity (p=.001), and educational background (p=.042), but not for gender (p=.908). Specifically, UiTM Samarahan had a higher proportion of older students aged 26-28 years and Sarawakian students, reflecting its geographical location in East Malaysia, whilst also demonstrating a higher proportion of Diploma holders (n=19, 47.5%) compared to other campuses.

Differences of students perception towards F2F learning between FSR UiTM campuses

Table 2: Students Perception towards the Face to Face learning for applied exercise rehabilitation subjects between campuses

		FSR Shah Alam (n=87)			FSR Samarahan (n=40)			FSR Seremban (n=37)			FSR Arau (n=48)			Sig.
		F	%	Adj. Res.	F	%	Adj. Res.	F	%	Adj. Res.	F	%	Adj. Res.	
Effectiveness of F2F in increasing fundamental knowledge	Extremely ineffective	0	0	-8	1	0.5	2.1	0	0	-5	0	0.0	-5	.004
	Ineffective	2	0.9	-4	1	0.5	-1	1	0.5	-1	2	0.9	.6	
	Neutral	10	4.7	-1.5	12	5.7	2.7	11	5.2	2.5	1	0.5	-3.0	
	Effective	57	26.9	1.7	15	7.1	-3.0	16	7.5	-2.1	36	17	2.6	

	Extremely effective	18	8.5	-.4	9	4.2	.3	9	4.2	.3	9	4.2	1.6	
Effectiveness of F2F in increasing clinical skills	Extremely ineffective	0	0.0	-.8	0	0.0	-.5	0	0.0	-.5	1	0.5	1.9	
	Ineffective	0	0.0	-.8	1	0.5	2.1	0	0.0	-.5	0	0.0	-.5	
	Neutral	13	6.1	.8	5	2.4	.0	8	3.8	1.8	1	0.5	-2.5	.149
	Effective	33	15.6	-1.2	19	9.0	.6	16	7.5	.0	23	10.8	.8	
	Extremely effective	41	19.3	.9	15	7.1	-.8	13	6.1	-1.1	23	10.8	.7	
Effectiveness of F2F in increasing social competency	Ineffective	1	0.5	-1.0	1	0.5	.1	2	0.9	1.3	1	0.5	-.1	
	Neutral	6	2.8	-2.0	9	4.2	2.2	8	3.8	1.9	3	1.4	-1.4	
	Effective	55	25.9	2.4	13	6.1	-2.9	17	8.0	-1.0	28	13.2	.8	.025
	Extremely effective	25	11.8	-.9	17	8.0	1.6	10	4.7	-.7	16	7.5	.2	

Table 2 presents student perceptions of F2F learning effectiveness for Applied Exercise Rehabilitation courses across four FSR UiTM campuses. Chi-square analysis revealed significant differences across campuses for effectiveness in increasing fundamental knowledge ($p=.004$) and social competency ($p=.025$), but not for clinical skills ($p=.149$).

For fundamental knowledge, students at FSR UiTM Arau campus demonstrated the most favourable perceptions, being significantly more likely to rate F2F learning as effective (36 students, 17.0%; adj. res.=2.6) and significantly less likely to provide neutral ratings (1 student, 0.5%; adj. res.=-3.0). In contrast, students at FSR UiTM Samarahan campus demonstrated less favourable perceptions, being significantly more likely to rate F2F learning as extremely ineffective (1 student, 0.5%; adj. res.=2.1) and neutral (12 students, 5.7%; adj. res.=2.7), whilst being significantly less likely to rate it as effective (15 students, 7.1%; adj. res.=-3.0). Students at FSR UiTM Seremban showed higher uncertainty with significantly more neutral ratings (11 students, 5.2%; adj. res.=2.5) and fewer effective ratings (16 students, 7.5%; adj. res.=-2.1).

For clinical skills, although no overall significant difference was observed ($p=.149$), adjusted residuals indicated that students at FSR UiTM Samarahan were more likely to rate F2F learning as ineffective (1 student, 0.5%; adj. res.=2.1), whilst students at FSR UiTM Arau were less likely to provide neutral ratings (1 student, 0.5%; adj. res.=-2.5).

For social competency, students at FSR UiTM Shah Alam demonstrated the most favourable perceptions, being significantly more likely to rate F2F learning as effective (55 students, 25.9%; adj. res.=2.4) and significantly less likely to provide neutral ratings (6 students, 2.8%; adj. res.=-2.0). In contrast, students at FSR UiTM Samarahan demonstrated the least favourable perceptions, being significantly more likely to provide neutral ratings (9 students, 4.2%; adj. res.=2.2) and significantly less likely to rate it as effective (13 students, 6.1%; adj. res.=-2.9).

Differences of students perception towards BL between FSR UiTM campuses

Table 3: Students Perception towards BL for applied exercise rehabilitation subjects between campuses

		FSR Shah Alam (n=87)			FSR Samarahan (n=40)			FSR Seremban (n=37)			FSR Arau (n=48)			Sig.
		F	%	Adj. Res.	F	%	Adj. Res.	F	%	Adj. Res.	F	%	Adj. Res.	
Effectiveness of BL in increasing fundamental knowledge	Extremely ineffective	14	6.6	1.8	3	1.4	-0.8	0	0.0	-2.4	7	3.3	.8	.001
	Ineffective	44	20.8	1.8	9	4.2	-3.0	2	0.9	-5.1	37	17.5	5.4	
	Neutral	21	9.9	1.0	14	6.6	2.5	7	3.3	-.3	2	0.9	-3.2	
	Effective	6	2.8	-3.6	9	4.2	.7	22	10.4	7.1	2	0.9	-2.9	
	Extremely effective	2	0.9	-1.9	5	2.4	1.9	6	2.8	2.8	0	0	-2.0	
Effectiveness of BL in increasing clinical skills	Extremely ineffective	20	9.4	.5	5	2.4	-1.5	2	0.9	-2.6	18	8.5	3.1	.001
	Ineffective	40	18.9	1.8	10	4.7	-2.0	8	3.8	-2.3	24	11.3	1.8	
	Neutral	21	9.9	1.0	12	5.7	1.6	6	2.8	-.7	5	2.4	-2.0	
	Effective	5	2.4	-2.7	7	3.3	.9	15	7.1	5.4	1	0.5	-2.6	
	Extremely effective	1	0.5	-2.5	6	2.8	2.6	6	2.8	2.8	0	0.0	-2.0	
Effectiveness of BL in increasing social competency	Extremely ineffective	14	6.6	.9	3	1.4	-1.3	3	1.4	-1.1	9	4.2	1.2	.001
	Ineffective	43	20.3	1.2	14	6.6	-1.3	6	2.8	-3.8	31	14.6	3.2	
	Neutral	20	9.4	.4	9	4.2	.1	10	4.7	.9	7	3.3	-1.4	
	Effective	9	4.2	-1.7	9	4.2	1.3	14	6.6	4.1	1	0.5	-2.9	
	Extremely effective	1	0.5	-2.0	5	2.4	2.6	4	1.9	1.9	0	0.0	-1.8	

Legend n=number, FSR=Faculty Sports and Recreation, Sig.= Significant, F=frequency, %=percentage, Adj. Res.=Adjusted Residual, F2F=Face two face, BL=Blended Learning, Sig.=Significant

Table 3 presents student perceptions of BL effectiveness for Applied Exercise Rehabilitation courses across four FSR UiTM campuses. Chi-square analysis revealed significant differences across campuses for all three competency domains: fundamental knowledge ($p=.001$), clinical skills ($p=.001$), and social competency ($p=.001$).

For fundamental knowledge, students at FSR UiTM Seremban demonstrated the most positive perceptions, being significantly less likely to BL as extremely ineffective (0 students, 0.0%; adj. res.=-2.4) or ineffective (2 students, 0.9%; adj. res.=-5.1), whilst being significantly more likely to rate it as effective (22 students, 10.4%; adj. res.=7.1) and extremely effective (6 students, 2.8%; adj. res.=2.8). Conversely, students at FSR UiTM Arau demonstrated the most negative perceptions, being significantly more likely to rate BL as ineffective (37 students, 17.5%; adj. res.=5.4), whilst being significantly less likely to rate it as neutral (2 students, 0.9%; adj. res.=-3.2), effective (2 students, 0.9%; adj. res.=-2.9), or extremely effective (0 students, 0.0%; adj. res.=-2.0). Students at FSR UiTM Shah Alam were significantly less likely to rate BL as effective (6 students, 2.8%; adj. res.=-3.6), whilst students at FSR UiTM Samarahan were significantly less

likely to rate it as ineffective (9 students, 4.2%; adj. res.= -3.0) and more likely to provide neutral ratings (14 students, 6.6%; adj. res.=2.5).

For clinical skills, students at FSR UiTM Seremban again demonstrated the most positive perceptions, being significantly less likely to rate BL as extremely ineffective (2 students, 0.9%; adj. res.= -2.6) or ineffective (8 students, 3.8%; adj. res.= -2.3), whilst being significantly more likely to rate it as effective (15 students, 7.1%; adj. res.=5.4) and extremely effective (6 students, 2.8%; adj. res.=2.8). Conversely, students at FSR UiTM Arau demonstrated the most negative perceptions, being significantly more likely to rate BL as extremely ineffective (18 students, 8.5%; adj. res.=3.1), whilst being significantly less likely to rate it as neutral (5 students, 2.4%; adj. res.= -2.0), effective (1 student, 0.5%; adj. res.= -2.6), or extremely effective (0 students, 0.0%; adj. res.= -2.0). Students at FSR UiTM Shah Alam were significantly less likely to rate BL as effective (5 students, 2.4%; adj. res.= -2.7) or extremely effective (1 student, 0.5%; adj. res.= -2.5). Students at UiTM Samarahan were significantly less likely to rate it as ineffective (10 students, 4.7%; adj. res.= -2.0) and more likely to rate it as extremely effective (6 students, 2.8%; adj. res.=2.6).

For social competency, students at FSR UiTM Seremban demonstrated the most positive perceptions, being significantly more likely to rate BL as effective (14 students, 6.6%; adj. res.=4.1). Students at FSR UiTM Arau demonstrated the most negative perceptions, being significantly more likely to rate BL as ineffective (31 students, 14.6%; adj. res.=3.2) and significantly less likely to rate it as effective (1 student, 0.5%; adj. res.= -2.9). Students at UiTM Samarahan were significantly less likely to rate BL as ineffective (6 students, 2.8%; adj. res.= -3.8) and more likely to rate it as extremely effective (5 students, 2.4%; adj. res.=2.6). Students at FSR UiTM Shah Alam were significantly less likely to rate BL as extremely effective (1 student, 0.5%; adj. res.= -2.0).

Overall, BL was perceived less favourably compared to F2F learning across all campuses and competency domains. However, substantial campus-specific variations were evident, with FSR UiTM Seremban consistently demonstrating the most positive perceptions of BL effectiveness across all three domains, whilst FSR UiTM Arau consistently showed the least favourable perceptions. These contrasting patterns suggest significant differences in BL implementation, technological infrastructure, or instructional design across campuses.

Students perceptions which learning classes are enjoyable between campuses

Table 4: Students rate on enjoyable learning classes for applied exercise rehabilitation subjects between campuses

		FSR Shah Alam (n=87)			FSR Samarahan (n=40)			FSR Seremban (n=37)			FSR Arau (n=48)			Sig.
		F	%	Adj. Res.	F	%	Adj. Res.	F	%	Adj. Res.	F	%	Adj. Res.	
Enjoyable F2F classes	Unenjoyable	0	0.0	-.8	0	0.0	-.5	0	0.0	-.5	1	0.5	1.9	.179
	Somewhat enjoyable	10	4.7	.1	6	2.8	.8	6	2.8	1.0	2	0.9	-1.8	
	Very enjoyable	41	19.3	1.1	11	5.2	-2.1	18	8.5	.8	20	9.4	-1	
	Extremely enjoyable	36	17.0	-1.1	23	10.8	1.7	13	6.1	-1.4	25	11.8	1.0	
	Extremely unenjoyable	4	1.9	-.8	4	1.9	1.1	0	0.0	-1.7	5	2.4	1.4	

Enjoyable BL classes	Unenjoyable	52	24.5	2.5	11	5.2	-3.1	4	1.9	-5.2	38	17.9	4.7	.001
	Somewhat enjoyable	23	10.8	1.4	12	5.7	1.4	8	3.8	.0	3	1.4	-3.0	
	Very enjoyable	7	3.3	-2.6	6	2.8	-2	19	9.0	6.4	2	0.9	-2.5	
	Extremely enjoyable	1	0.5	-2.7	7	3.3	3.1	6	2.8	2.6	0	0.0	-2.1	

Legend n=number, FSR=Faculty Sports and Recreation, Sig.= Significant, F=frequency, %=percentage, Adj. Res.=Adjusted Residual, F2F=Face two face, BL=Blended Learning, Sig.=Significant

Table 4 presents student ratings on enjoyment of learning classes for Applied Exercise Rehabilitation courses across four FSR UiTM campuses. Chi-square analysis revealed no significant difference across campuses for enjoyment of face-to-face learning classes ($p=.179$), but a significant difference for enjoyment of BL classes ($p=.001$).

For F2F learning enjoyment, although no overall significant difference was observed, students at FSR UiTM Samarahan were significantly less likely to rate F2F classes as very enjoyable (11 students, 5.2%; adj. res.=-2.1) compared to other campuses. Overall, the majority of students across all campuses found F2F learning classes very enjoyable (41.5%) or extremely enjoyable (44.8%), indicating high satisfaction with F2F instruction.

For BL enjoyment, substantial campus-specific variations were evident. Students at FSR UiTM Seremban demonstrated the highest enjoyment of BL, being significantly less likely to rate it as unenjoyable (4 students, 1.9%; adj. res.=-5.2), whilst being significantly more likely to rate it as very enjoyable (19 students, 9.0%; adj. res.=6.4) and extremely enjoyable (6 students, 2.8%; adj. res.=2.6). Conversely, students at FSR UiTM Arau demonstrated the lowest enjoyment, being significantly more likely to rate BL as unenjoyable (38 students, 17.9%; adj. res.=4.7), whilst being significantly less likely to rate it as somewhat enjoyable (3 students, 1.4%; adj. res.=-3.0), very enjoyable (2 students, 0.9%; adj. res.=-2.5), or extremely enjoyable (0 students, 0.0%; adj. res.=-2.1). Students at FSR UiTM Shah Alam showed similar negative patterns, being significantly more likely to rate BL as unenjoyable (52 students, 24.5%; adj. res.=2.5), whilst being significantly less likely to rate it as very enjoyable (7 students, 3.3%; adj. res.=-2.6) or extremely enjoyable (1 student, 0.5%; adj. res.=-2.7). Students at FSR UiTM Samarahan demonstrated more positive perceptions, being significantly less likely to rate BL as unenjoyable (11 students, 5.2%; adj. res.=-3.1) and significantly more likely to rate it as extremely enjoyable (7 students, 3.3%; adj. res.=3.1).

Overall, F2F learning was rated as more enjoyable than BL across all campuses. The contrasting patterns for BL enjoyment align with previous findings on BL effectiveness, with FSR UiTM Seremban consistently demonstrating the most positive perceptions and FSR UiTM Arau demonstrating the least favourable perceptions. These findings suggest that enjoyment of BL classes is closely associated with perceived effectiveness, and campus-specific factors significantly influence student engagement and satisfaction with online instruction.

DISCUSSION

This study examined differences in student perceptions of F2F and BL effectiveness across four FSR UiTM campuses. The findings reveal significant campus-specific variations in student perceptions, particularly regarding BL effectiveness, while demonstrating relatively consistent positive perceptions of F2F instruction across all locations.

Interpreted through the theory of COI framework, the findings provide empirical support for the proposition that campus-level disparities in teaching presence, defined as the design, facilitation, and direction of cognitive and social processes contingent on instructor technological proficiency, instructional design quality, and platform reliability, constitute the primary driver of inter-campus variation in BL perceptions.

The substantially more favourable BL perceptions at FSR UiTM Seremban suggest that teaching presence was more robustly established at this campus, whilst the consistently unfavourable perceptions at FSR UiTM Arau are consistent with a deficit in teaching presence that undermined students' ability to construct meaning and maintain social connectedness during the online phase. The uniform positive perceptions of F2F instruction across all campuses further affirm that physical co-location reliably establishes social presence through direct peer interaction and shared psychomotor practice, a condition that online environments require deliberate instructional design to replicate. These findings extend the CoI framework's applicability to multi-campus university contexts, demonstrating that institutional and infrastructural factors operate as structural determinants of teaching and social presence that individual instructors cannot fully compensate for without targeted institutional support.

The analysis revealed significant differences across campuses for F2F effectiveness in developing fundamental knowledge ($p=.004$) and social competency ($p=.025$), though not for clinical skills ($p=.149$). Students at FSR UiTM Arau demonstrated the most favourable perceptions of F2F instruction for fundamental knowledge acquisition, while FSR UiTM Shah Alam students reported the highest effectiveness ratings for social competency development. These findings align with established literature emphasising the pedagogical strengths of F2F instruction in applied exercise and sports disciplines, where direct instructor-student interaction, immediate feedback, and physical demonstration facilitate both cognitive and affective learning outcomes (Kemp & Grieve, 2014; Schmidt & Lee, 2025). The relatively consistent positive perceptions of F2F instruction across campuses, particularly for clinical skills development, supports previous research demonstrating that psychomotor competencies in exercise rehabilitation education benefit substantially from in-person instruction (Blackstock & Evans, 2019; Magill & Anderson, 2010). The physical presence required for manual guidance, tactile cueing, and real-time corrective feedback during practical skill acquisition appears to be valued consistently regardless of campus location or infrastructure variations. This finding reinforces the continued importance of maintaining substantive F2F components within blended learning designs for psychomotor-intensive disciplines. The less favourable F2F perceptions observed at FSR UiTM Samarahan, particularly the higher proportion of neutral and negative ratings, may reflect the campus's unique demographic composition. FSR UiTM Samarahan demonstrated significantly higher proportions of older students (26-28 years) and diploma holders compared to other campuses. These students may possess different learning preferences shaped by prior educational experiences or may face competing demands from employment and family responsibilities that reduce engagement with scheduled F2F sessions (Bernard et al., 2014). However, as demographic variables were not controlled in the primary analyses, this interpretation remains speculative and should be treated as a direction for future investigation rather than a confirmed explanatory factor.

The most striking finding concerns the substantial campus variations in BL perceptions, with highly significant differences observed across all three competency domains: fundamental knowledge, clinical skills, and social competency (all $p=.001$). FSR UiTM Seremban consistently demonstrated the most positive perceptions of BL effectiveness, while FSR UiTM Arau consistently exhibited the least favourable perceptions across all domains. The contrasting perceptions between FSR UiTM Seremban and FSR UiTM Arau campuses warrant careful interpretation. Several factors may account for these disparities. First, infrastructure and technological resources likely differ across campuses, with variations in internet connectivity, learning management system functionality, and access to digital devices influencing students' BL experiences (Rasheed et al., 2020). Students experiencing reliable technological infrastructure may develop more positive perceptions of online learning components, while those encountering connectivity issues or platform limitations may associate BL with frustration and inefficiency. Second, lecturer with technological proficiency and pedagogical approaches to BL implementation may vary across campuses. Research demonstrates that instructor competence in designing engaging online content, facilitating virtual discussions, and providing timely feedback significantly influences student perceptions of BL effectiveness (Crawford et al., 2020; Owston et al., 2013). Campuses where instructors have received more extensive training in online pedagogy or have developed more sophisticated BL designs may produce more

favourable student perceptions. Third, the quality and design of online learning materials specifically tailored for psychomotor skill development may differ across campuses. Effective BL for exercise rehabilitation requires carefully designed video demonstrations, interactive simulations, and structured self-assessment activities that complement F2F practical sessions (Gagnon et al., 2020). Campuses that have invested in developing high-quality multimedia resources for clinical skills instruction may achieve better student outcomes and perceptions. The notably negative BL perceptions at FSR UiTM Arau, combined with this campus's strongest positive perceptions of F2F instruction, suggests a pronounced preference for traditional instructional delivery among this student cohort. This pattern may indicate that students at this campus have not experienced well-designed BL implementation or may reflect regional factors including infrastructure limitations in the northern region that compromise online learning quality.

The analysis of learning enjoyment revealed no significant differences across campuses for F2F classes ($p=.179$), with consistently high enjoyment ratings across all locations. This uniformity contrasts sharply with the highly significant campus differences observed for BL enjoyment ($p=.001$), mirroring the patterns observed for perceived effectiveness. FSR UiTM Seremban students reported substantially higher enjoyment of BL classes, while FSR UiTM Arau and Shah Alam students demonstrated lower enjoyment levels. The strong correlation between perceived effectiveness and enjoyment is consistent with Self-Determination Theory, which identifies perceived competence as a basic psychological need whose satisfaction simultaneously generates intrinsic motivation and enjoyment as co-dependent outcomes (Chiu, 2022; Ryan & Deci, 2024). Students who perceive BL as effective in developing their competencies are therefore more likely to experience intrinsic motivation and enjoyment within that environment, as both are products of the same need fulfilment process rather than causally sequential states. This pattern further suggests that campuses failing to establish adequate teaching presence during the online phase undermine not only perceived learning effectiveness but the motivational conditions necessary for sustained engagement, compounding the inequity in BL experiences across FSR UiTM campuses.

These findings carry important implications for BL implementation across multi-campus university systems. The substantial variations in student perceptions suggest that standardised BL approaches may produce inequitable learning experiences when infrastructure, resources, and implementation quality differ across locations. University administrators and curriculum designers should conduct campus-specific assessments to identify factors contributing to negative BL perceptions and develop targeted interventions. For FSR UiTM specifically, the findings indicate a need for investigation into the factors underlying Seremban's successful BL implementation. Before Seremban's BL implementation can serve as an institutional benchmark, a systematic qualitative investigation is required to document the specific instructional design decisions, platform utilisation practices, instructor engagement strategies, and technological resources that distinguish its online delivery from less favourably perceived campuses. Without this foundational evidence, recommending institution-wide adoption of FSR UiTM Seremban practices risks replicating structural features without understanding the pedagogical mechanisms driving its favourable student perceptions. Future research should therefore prioritise a mixed-methods campus comparison, combining student focus groups, instructor interviews, and learning management system audit data, to identify the transferable elements of FSR UiTM Seremban BL approach. Only upon establishing this evidence base should targeted quality improvement initiatives be designed for FSR UiTM Shah Alam and Arau, potentially encompassing enhanced instructor training in online pedagogy, investment in digital infrastructure, and development of high-quality multimedia resources for psychomotor skill instruction.

Several limitations should be considered when interpreting these findings. The cross-sectional design prevents causal inferences regarding factors influencing student perceptions. The convenience sampling approach and varying sample sizes across campuses may limit generalisability. The study did not directly assess infrastructure quality, instructor competence, or specific BL design features that might explain

campus differences. Future research should employ mixed-methods approaches to explore the contextual factors underlying observed perception differences and examine relationships between student perceptions, actual learning outcomes, and specific BL implementation characteristics. The study did not control for demographic variables including age and prior qualification in the primary chi-square analyses. Demographic differences across campuses, particularly at FSR UiTM Samarahan, represent uncontrolled confounds that may partially account for the observed perceptual differences. Future studies should employ multivariate analytical approaches, such as binary logistic regression with demographic covariates, to isolate the independent contribution of campus location from individual student characteristics in predicting BL and F2F perceptions. A further limitation concerns the potential for social desirability bias in self-reported perception data. Where lecturers were involved in participant recruitment, students may have moderated their responses toward more favourable ratings to align with perceived instructor expectations, particularly for items directly assessing the effectiveness of instructional delivery associated with their lecturers' pedagogical decisions. This response bias is inherent to classroom-based survey research and cannot be fully eliminated through questionnaire design alone. It may have contributed to the consistently positive F2F perceptions observed across all campuses and potentially attenuated the expression of negative BL perceptions at certain locations. Future studies should consider anonymous online data collection administered independently of course instructors, or the inclusion of validated social desirability scales, to assess and statistically control for this bias.

CONCLUSION

This study demonstrated that F2F instruction generated consistently positive student perceptions across all four FSR UiTM campuses, whilst BL perceptions varied substantially by location, with FSR UiTM Seremban reporting the most favourable and FSR UiTM Arau the least favourable perceptions across all competency domains. Interpreted through the COI framework, these findings suggest that campus-level disparities in teaching presence, social presence, and technological infrastructure are associated with inequitable BL experiences within a single university system sharing a common curriculum, a pattern that single-institution studies have been structurally unable to detect. This contributes to the broader multi-campus BL equity literature by demonstrating that modality alone does not determine learning experience quality; rather, the institutional conditions under which BL is delivered are equally consequential. It should be noted that the cross-sectional design of this study precludes causal conclusions, and the observed campus differences in BL perceptions are best understood as associations warranting further investigation rather than confirmed effects of specific infrastructural or pedagogical factors. At the policy level, these findings call for institutional audit mechanisms that monitor BL implementation quality across campuses systematically, rather than assuming curricular standardisation produces experiential equivalence. Future research should prioritise mixed-methods campus comparisons and longitudinal designs to establish the causal pathways connecting implementation conditions to student perceptions and objective learning outcomes.

AUTHORS' CONTRIBUTION

This paper was completed through collaborative effort among multiple contributors. Sarah Syafieqah Anuwar, Siti Nurul Ezzah Che Man, and Siti Arnalee Dewina Arman were responsible for methodology development, data collection, data analysis, and writing the original draft of the manuscript. Rahmat Adnan, Shariman Ismadi Ismail, Norasrudin Sulaiman, and Mazuin Razalli contributed to the conceptualisation of the study, methodology design, writing review and editing, and provided supervision throughout the research process.

CONFLICT OF INTEREST

Authors declare there is no conflict of interest for this study.

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