

ASSESSING STUDIO-BASED TEACHING AND LEARNING (SBTL) THROUGH PHYSICAL AND VIRTUAL CLASSROOM AMONG POSTGRADUATE STUDENTS

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Abstract

Design studio projects are fundamental to environmental education, as they facilitate the integration of theoretical knowledge with creative practice through experiential, collaborative, and reflective learning. This study assesses the effectiveness of teaching and learning strategies in a postgraduate design studio course, focusing on student engagement, critical thinking, and project outcomes in the Urban Development and Management Master's programme, specifically UDM 720, Urban Development Project. The research addresses uncertainties in student expectations, inconsistent learning outcomes, and varying satisfaction levels, all of which are influenced by differences in supervisory approaches and challenges with group work. A case study methodology was employed, combining quantitative and qualitative methods. Quantitative data, including student performance records and survey responses, offer insights into trends in academic achievement and satisfaction. Qualitative data from classroom observations provides a deeper understanding of student involvement, interactions, and learning experiences in the studio environment. The sample consists of 25 postgraduate students across four academic sessions. The findings indicate that although students value the exploratory aspects of studio-based learning, they encounter challenges with unclear assessment criteria and inconsistent feedback. Successful learning outcomes are linked to systematic guidance, iterative critique processes, and well-defined rubrics that align creativity with technical requirements. The study determines that enhancing clarity in instructional goals, aligning assessment with learning outcomes, and fostering reflective dialogue between instructors and students can improve studio effectiveness. Recommendations include adopting digital feedback tools, implementing a standardised assessment framework, and enhancing professional development for studio lecturers to promote consistency and innovation in postgraduate design education.

Keywords: Design Studio, Postgraduate Education, Teaching and Learning, Student Involvement

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Introduction

Design studios form the foundation of architectural and urban development education by immersing students within environments that connect theory with practice (Ilter, 2023). For postgraduates, these studios require advanced critical thinking, problem-solving, and independent inquiry, with the learning environment fulfilling a crucial role in student success. Traditionally, physical studios support creativity and professional skills through direct interaction. The emergence of virtual and hybrid formats, accelerated by COVID-19, has shifted these dynamics (Izadpanah et al., 2022). While online studios provide flexibility and digital tools, they can restrict communication, diminish spatial engagement, and rely on stable technology. Striking a balance between these modalities is a key challenge. Balancing the strengths of physical and virtual studio modes is essential for sustaining student involvement, reflective

practice and learning outcomes in postgraduate design courses. Ineffective integration of these modalities can reduce overall educational impact. This study examines the effectiveness of pedagogical approaches in the Urban Development Management (UDM) course, specifically UDM720 - Urban Development Project, by analysing learning experiences, student satisfaction, and project outcomes. Although the studio model has the potential to foster creativity, variations in supervisory styles and group dynamics have led to inconsistent and misaligned outcomes, thereby impeding holistic development (Pavlou, 2024). The paper evaluates current teaching and learning strategies in UDM720 by assessing student satisfaction across both physical and virtual classroom settings and identifying key challenges that influence successful studio outcomes. The findings guide educators and curriculum designers in developing highly resilient, adaptable studio models that maintain experiential depth while leveraging the flexibility and technological advantages of virtual platforms, thereby enhancing learning outcomes.

Literature Review

Issues and challenges in both learning modes

Studio-based teaching and learning (SBTL) is the backbone of design education, known for its immersive, collaborative, and progressive nature (Harinarain & Haupt, 2016; Megahed, 2018). Physical studios foster face-to-face interaction, immediate critique, and spatial engagement, thereby promoting creativity and career development (Ilter, 2023). However, they also have limitations, including fixed schedules, inflexibility, and limited access to experts (Peimani & Kamalipour, 2022).

The shift to virtual and hybrid studios, particularly during COVID-19, redefined these dynamics (Komarzyńska-Świeściak et al., 2021; Izadpanah et al., 2022). Virtual studios offer flexibility, wider participation, and integration with digital tools (Khan & Thilagam, 2022), but they also pose challenges, including reduced peer interaction, delayed feedback, and reliance on technology (Butragueno et al., 2021; Hepburn & Borthwick, 2021). Varying levels of digital skills and a lack of in-person engagement also raise concerns about reflective learning (Nespoli et al., 2021; Pavlou, 2024).

Key aspects of studio-based teaching and learning (SBTL)

Various interrelated factors shape student satisfaction in SBTL. Clear assessment aligns expectations and ensures fairness, whereas ambiguous rubrics or grading undermine trust (UNSW, 2025.). Skill development—including conceptual thinking, technical ability, and reflective practice—is supported in traditional studios and can also occur in virtual settings through structured digital facilitation (Peimani & Kamalipour, 2022; Ilter, 2023).

As Megahed (2018) notes, the studio environment, whether physical or virtual, affects engagement and participation. Physical studios immerse students in a design-focused atmosphere, whereas online platforms require careful planning to replicate collaborative and creative cultures (Harinarain & Haupt, 2016; Pavlou, 2024). Hepburn & Borthwick (2021) argue that feedback quality and peer interaction remain central to the studio model. Immediate, iterative critique in physical studios often contrasts with delayed or asynchronous feedback online (Nespoli et al., 2021). Virtual peer interaction can be effective when intentionally designed, but risks fragmentation without active facilitation (Butragueno et al., 2021). SBTL has a positive impact on student achievement and involvement, particularly in creative fields such as art, design, and architecture (Baharuddin et al., 2025).

Ways for improvements for SBTL

Several studies recommend strategies to improve both physical and virtual SBTL delivery. Time management can be improved through precise scheduling, milestone planning, and integrating synchronous and asynchronous tasks to accommodate diverse schedules, especially among postgraduate students who work and study simultaneously while managing family responsibilities (Izadpanah et al., 2022; Khan & Thilagam, 2022). Meanwhile, the application of digital tools, such as collaborative design software and cloud-based platforms, can enrich learning while closing the gap between physical and virtual experiences (Peimani & Kamalipour, 2022; Ilter, 2023).

Systematic guidance, delivered through detailed briefs, tutorials, and activities, reduces uncertainty and supports self-directed work (Harinarain & Haupt, 2016; UNSW, 2025). Pavlou (2024) noted that hybrid jury sessions enable contributions from external experts without compromising the immediacy of critique. Enhancing rubrics and evaluation improves openness and equity, particularly in virtual contexts, where recorded feedback and explicit criteria help address bias (Megahed, 2018). The Virtual Design Studio's structured activity plan was key to learner involvement and flexible participation, supporting educational goals (Shariatrad et al., 2025). These strategies balance the strengths of both modes while mitigating their limitations.

THEORETICAL FRAMEWORK: OPTIMIZING STUDIO-BASED TEACHING AND LEARNING (SBTL)

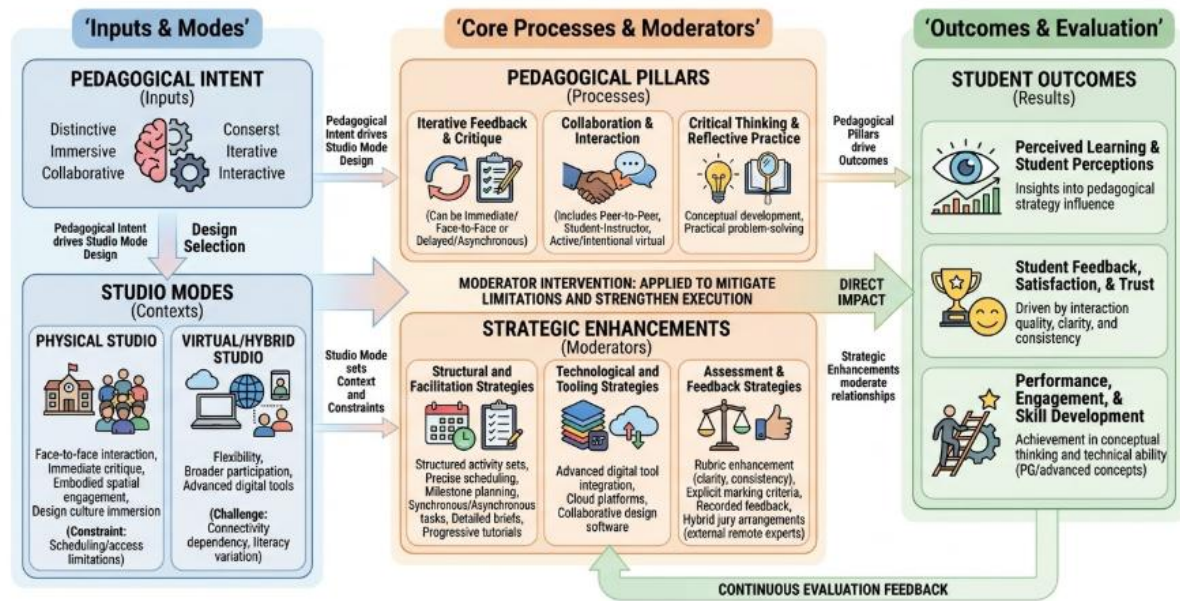


Figure 1: Theoretical Framework for SBTL to show the linkages

Methods

To investigate this issue, the research adopted a case-study approach to examine students' learning experiences in the postgraduate design studio course, combining quantitative and qualitative methods for an extensive analysis. The case study focused on a specific cohort enrolled in the master's programme in Urban Development and Management. A quantitative survey design was utilised as the primary method of data collection to capture postgraduate preferences, issues, and suggestions regarding physical and virtual SBTL, enabling an objective understanding of trends in academic achievement and satisfaction. To complement the survey findings, classroom observations were carried out during selected studio sessions. These observations were used to gain contextual insight into teaching and learning interactions, including critique sessions, critique discussions, and student involvement with the design studio environment. The observations were not used as a formal qualitative dataset but rather to support the interpretation of the survey results.

The sampling frame comprised all registered students in the programme for the course, spanning four consecutive academic sessions. A purposive sampling approach was adopted to include only students with direct experience of both physical and virtual studio settings. This method was appropriate given the study's aim of capturing informed perspectives from participants who engaged with the course through different delivery modes. Across the four sessions, 25 postgraduate students responded to the survey: 9 in session 20252, 8 in session 20244, 4 in session 20242, and 4 in session 20232. Data were collected using a structured questionnaire comprising Likert-scale items measuring students' perceptions and satisfaction with the design studio learning experience. It was designed to capture I.) students' preferences between physical and virtual classrooms, II.) key issues and challenges

experienced in each mode, and III.) suggestions for improving SBTL.

The questionnaire items were developed from existing literature on studio-based learning and student involvement, with adaptations to suit the postgraduate design studio course context. It comprised closed-ended items on a five-point Likert scale, ranging from strongly disagree to strongly agree. An open-ended question was included to allow elaboration of views. The survey link was distributed via student email and course communication platforms (WhatsApp). Participation in the survey was voluntary, and responses were collected anonymously. Students were informed of the study's purpose and assured that the data would be used solely for research and academic purposes. The collected data were analysed using descriptive statistics, including frequency, percentage, and mean rank scores—the analysis aimed to summarise students' perceptions of various aspects of the studio learning experience quantitatively. At the same time, qualitative responses, particularly from open-ended questions, were thematically analysed to identify emerging themes and generate recommendations. The findings are interpreted as context-specific insights within the case study setting, rather than as generalisable conclusions. The study was conducted in accordance with institutional research ethics guidelines.

Result and Discussion

Profiles of respondents

Table 1 presents the profile of postgraduate students with experience in SBTL. The majority (60%) were aged 20-29 years, indicating a predominantly younger postgraduate cohort, with 40% aged 30–49 years, reflecting age diversity. Female students comprised 60% of the sample, indicating higher female participation in the programme. In terms of academic stage, 36% were in Semester 1, while others were spread across Semesters 2 to 4. Notably, 16% had already graduated. This distribution shows that the study captured views from students at different stages of the programme, providing a thorough perspective on their experiences in the design studio learning environments.

Table 1. Respondent Profile of Postgraduate Students

Age	Frequency	Percentage
20-29	15	60%
30-39	5	20%
40-49	5	20%
TOTAL	N=25	100%
Gender	Frequency	Percentage
Female	15	60%
Male	10	40%
TOTAL	N=25	100%
Current Semester	Frequency	Percentage
Semester 1	9	36%
Semester 2	7	28%
Semester 3	3	12%
Semester 4	2	8%
Graduated	4	16%
TOTAL	N=25	100%

Key issues and challenges

The students were asked which learning mode, either physical, virtual, or both, was best suited to support each of the following aspects of their SBTL experience, as shown in Figure 2. Seven (7) aspects were considered to assess their satisfaction, namely: 1) achievement of course learning outcomes, 2) communication, 3) feedback and critique session, 4) interaction, engagement, and emotional support, 5) access and flexibility, and 6) reflective practice.

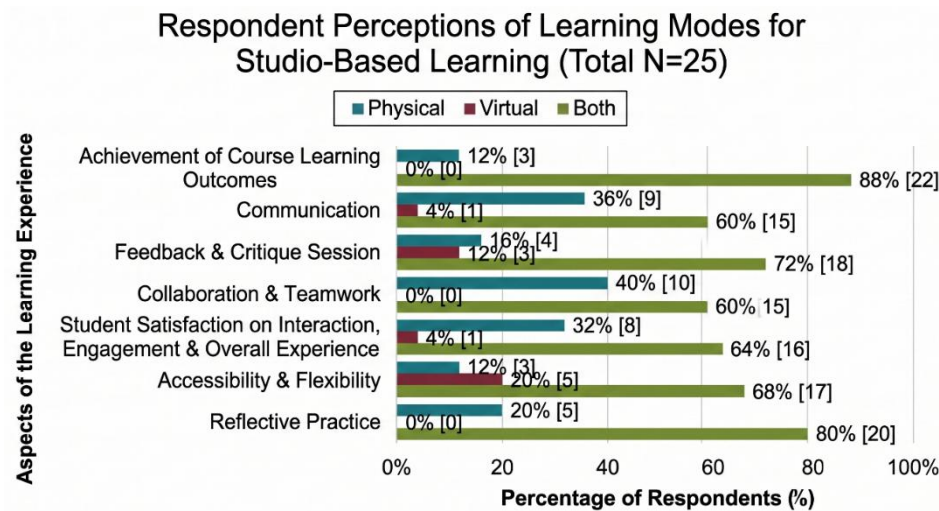


Figure 2. Aspects considered for physical, virtual, and both learning modes

The results showed that the majority of students preferred a combination of learning models in their SBTL experience, suggesting that a blended approach effectively supports broad learning needs. Most students preferred both learning modes in their SBTL experience, indicating the achievement of learning outcomes and reflective practice, with the highest satisfaction recorded at 22 and 20 responses (88% and 80%), respectively. This indicates that SBTL not only facilitates the acquisition of knowledge and skills but also encourages students to critically evaluate their learning methods. In contrast, communication and interaction, engagement, and flexibility each received 15 responses (60%), indicating moderate but still significant satisfaction in these areas. While these results show that SBTL provides ample opportunities for collaborative learning and adaptability, the slightly lower ratings compared to reflective practice may highlight areas for enhancement. Students were asked about key issues and challenges, which highlighted four (4) aspects: 1) social and collaborative space for learning, 2) evaluation system, 3) panels and critique sessions, and 4) time management.

Findings from Figure 3(a) indicate that 92% (23) of respondents consider the social and collaborative learning space to be very effective, based on their SBTL experience. They were also asked, via an open-ended question, how the social aspects of studio learning could be enhanced. Based on Table 2, the responses were categorised into five themes: S1) Group work and collaboration, S2) Cross-disciplinary and external engagement, S3) Informal and physical interaction, S4) Peer feedback and self-reflection, and S5) Supportive environments. Meanwhile, Figure 3(b) showed that 76% (19) of respondents rated the current evaluation system as fair and transparent, whilst 16% (4) claimed it was fair but sometimes unclear, and 8% (2) of respondents suggested it needed improvement. Their reasons were compiled into three (3) themes, as shown in Table 2: E1) Continuous assessment, E2) Peer and self-evaluation, and E3) interdisciplinary collaboration.

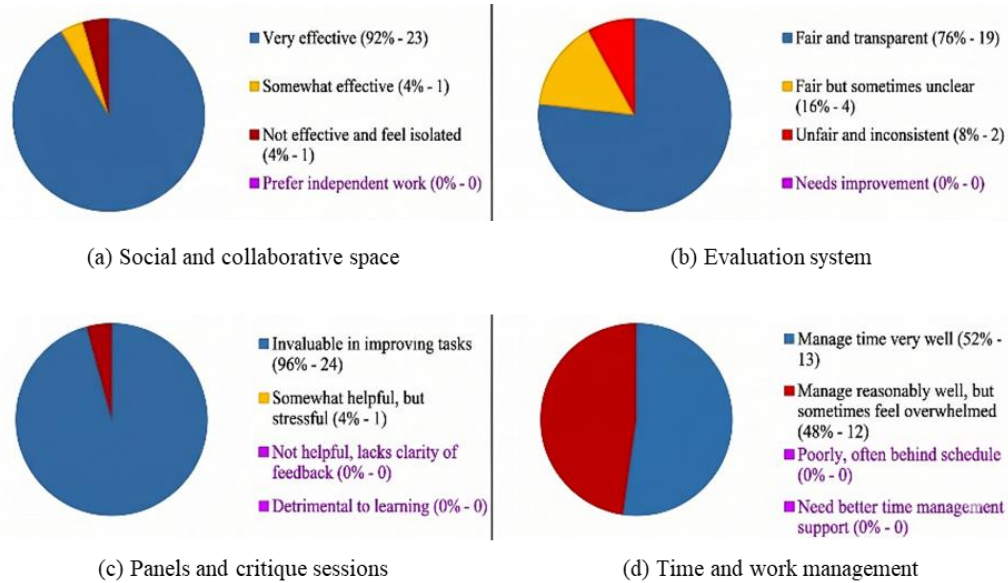


Figure 3. Perception of four elements in the SBTL experience

In addition, Figure 3(c) shows that 96% (24) of respondents agreed that the panel and critique sessions in their SBTL were invaluable in improving their tasks. Their perceptions of the selected answer were grouped into three (3) themes: P1) Skill development, P2) Panel contribution, and P3) Feedback time and approach. Finally, Figure 3(d) indicated that 52% (13) of respondents agreed they manage their time very well, whilst 48% (12) reported managing their time reasonably well but sometimes feeling overwhelmed. Their reasons were compiled into five (5) themes: T1) Travel and physical attendance, T2) Scheduling and submission flexibility, T3) Support systems, T4) Self-management strategies, and T5) Work-study balance. Further justification for the findings on their selection, as shown in Figure 3(a, b, c and d), was summarised in Table 2.

Based on these findings, it was vital to introduce multi-programme workshops, increase external stakeholder involvement, and promote peer-driven learning to make the studio environment progressively dynamic and socially engaging. In addition, students are sensitive to the learning atmosphere, valuing open, collaborative, and inclusive environments. Meanwhile, the current evaluation approach is functional but limited, focusing primarily on final deliverables. Shifting towards a more dynamic, formative assessment model could enhance learning outcomes by fostering peer and self-assessment, accountability, and critical thinking, and by supporting transparency and diversity in evaluation, which benefits students with different strengths. Regarding the panel and critique session, overall responses are positive, which improves both project quality and student development. However, feedback quality needs improvement, suggesting that more specific, effective guidance is preferred and that hybrid or in-person settings may increase clarity.

Table 2. Selected sample statements from respondents based on themes

Aspect	Theme	Selected sample of a statement from the respondent
Social and Collaborative Space (S)	S1	<i>More group activities and collaborative workshops can be included to ensure all members contribute, fostering mutual knowledge sharing.</i>
	S2	<i>Promote cross-programme collaboration with students from other fields, such as architecture and engineering, to broaden perspectives. Alternatively, involve external parties not only for the final presentation but also during the PLANMalaysia critique session for exposure.</i>
	S3	<i>Social interaction can be better with more discussion time, working together in the same place, and social events, e.g., small workshops or lunch or dinner meetups after class. This can help us feel more comfortable and work better together.</i>
	S4	<i>Conduct a few peer feedback sessions for each task and embed or foster a culture of self-reflection to encourage accountability and reduce passive group members.</i>
	S5	<i>The current group structure enables students to learn from peers with different experience levels and educational backgrounds, which I think is perfect.</i>
Evaluation system (E)	E1	<i>Adopt a more holistic and continuous assessment approach rather than relying heavily on the final submission.</i>
	E2	<i>Incorporating continuous assessment, valuing the creative process, using a clear rubric, and including peer and self-evaluation to provide a more holistic and supportive measure of student learning</i>
	E3	<i>Integrate interdisciplinary and cross-year collaboration.</i>
Panels and Critique Session (P)	P1	<i>I found it helpful to receive feedback from the lecturer and peers. It allowed me to improve my confidence, communication and presentation skills.</i>
	P2	<i>Panellists from industry and academia provide real-life insights.</i>
	P3	<i>I love having a physical session for a critique, and when I do it online, I find it hard to engage with the feedback; it is either rushed or too general.</i>
Time and workload (T)	T1	<i>It took more than an hour to travel from the office to class in a physical learning mode, compared to an online class.</i>
	T2	<i>Reminders and clear timelines, especially for group work and multi-phase tasks, make it easy to track progress.</i>
	T3	<i>For those who work and study, they may have a challenge adjusting their timing to do studio and their other responsibilities. Thus, family support is very significant.</i>
	T4	<i>Effective strategies, such as personal scheduling and early planning, are needed to manage my workload.</i>
	T5	<i>Balancing work and study with deadlines can be challenging, leading to stress and lower work quality.</i>

Time management emerged as a central challenge in SBTL, particularly for working professionals and international students. The studio model requires deep engagement, iterative work, and collaboration, which often conflict with rigid work schedules and inflexible personal commitments. While many students develop proactive coping strategies, even highly motivated individuals may feel overwhelmed when multiple deadlines overlap with assignments from other courses, especially during intensive studio phases.

Satisfaction level on the criteria involved in Studio-Based Teaching and Learning (SBTL)

The study assessed postgraduate students' satisfaction with six (6) key aspects of their SBTL experience using a 5-point Likert scale, as shown in Table 3. The aspects evaluated were 1) Skill development, 2) Clarity of assessment, 3) Studio environment, 4) Feedback quality, 5) Peer interaction, and 6) Overall studio experience.

Table 3. Perception and Satisfaction Level of Postgraduate Students on Criteria Involved in SBTL

Criteria or Aspects	Rating Scale on Satisfaction					Mean	Rank
	1	2	3	4	5		
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)		
Skill Development	0	0	2 (8)	8 (32)	15 (60)	4.52	2
Clarity of Assessment	0	0	1 (4)	11 (44)	13 (52)	4.48	3
Studio Environment	0	0	1 (4)	11 (44)	13 (52)	4.48	3
Feedback Quality	0	0	2 (8)	10 (40)	13 (52)	4.44	5
Peer Interaction	0	0	1 (4)	13 (52)	11 (44)	4.40	6
Studio Experience	0	0	2 (8)	7 (28)	16 (64)	4.56	1

Note: 1- Strongly Agree; 2- Disagree; 3- Neutral; 4- Agree; 5- Strongly Agree

Findings showed all mean scores were above 4.40, showing a high level of satisfaction across all measured dimensions. The highest-rated aspect was Studio experience, with a mean score of 4.56, followed by Skill development, with a mean score of 4.52. These results suggest that students found the studio sessions to be both enriching and effective in enhancing their professional capabilities. The clarity of assessment and the Studio environment both received identical mean scores of $M = 4.48$, indicating that students found the evaluation process straightforward and the learning environment conducive to their development. Meanwhile, feedback quality and peer interaction received slightly lower mean scores, which are $M = 4.44$ and $M = 4.40$, respectively, but still strong ratings, suggesting that while students valued the feedback and collaboration with peers, there are areas that may offer potential for enhancement.

Suggestion for improvement

The study collected student feedback on various suggestions to improve SBTL. Responses were rated on a 5-point Likert scale, and mean scores were calculated to assess agreement. The highest-rated suggestions were balance and effectiveness of physical and online learning (Mean score = 4.60), integrating digital tools for design and communication (Mean score = 4.60), structure and atmosphere of jury/critique sessions (Mean score = 4.40), and opportunities for professional development and industry exposure (Mean score = 4.32). By contrast, lower-rated suggestions included the use of well-defined rubrics for grading and feedback (Mean score = 3.48), structured guidance and iterative critique sessions (Mean score = 3.48), and the social and collaborative aspects of studio culture (Mean score = 3.44). Table 4 presents postgraduate students' suggestions for improving the studio-based learning experience.

Table 4. Suggestions for Improvement in the Studio-Based Learning Experience in CFAP771 Programme

Suggestion	Rating Scale on Satisfaction					Mean	Rank
	1	2	3	4	5		
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)		
Balance and effectiveness of physical and online learning	0	0	0	10 (40)	15 (60)	4.60	1
Social and collaborative aspects of studio culture	0	0	15 (60)	9 (36)	1 (4)	3.44	9
Transparency and fairness of the evaluation system	0	0	13 (52)	10 (40)	2 (8)	3.56	6
Structure and atmosphere of jury/critique sessions	0	0	0	15 (60)	10 (40)	4.40	3
Time Management support and workload planning	0	0	10 (40)	13 (52)	2 (8)	3.68	5
Integrating digital tools for design and communication	0	0		10 (40)	15 (60)	4.60	1
A standardised assessment framework	0	0	13 (52)	10 (40)	2 (8)	3.56	6
Opportunities for professional development and industry exposure	0	0	4 (16)	9 (36)	12 (48)	4.32	4
Structured guidance, iterative critique sessions	0	0	14 (56)	10 (40)	1 (4)	3.48	8
Use of well-defined rubrics for grading and feedback	0	0	8 (32)	16 (9)	1 (4)	3.40	10

Note: 1- Strongly Agree; 2- Disagree; 3- Neutral; 4- Agree; 5- Strongly Agree

The analysis indicates a clear preference for enhancements that strengthen blended learning methods and technology integration, as both received the highest mean score (4.60). This finding demonstrates strong student support for integrating in-person and digital strategies in studio education. A high rating for the jury/critique session structure and industry exposure reflects a desire for authentic, real-world learning experiences. These findings suggest students value structured critique processes and opportunities that connect academic work with professional practice. In contrast, suggestions related to rubrics, peer collaboration, and structured feedback loops received lower ratings, suggesting either a perceived adequacy in these areas or a lack of clarity about their importance or implementation. Figures 4, 5, and 6 presented the study's findings. These findings supported the quantitative findings and analysis, which showed a variety of approaches in their SBTL experience, including critique sessions, online briefings, presentations with an industrial panel, and site visits to different areas assigned according to their respective academic sessions.



Figure 4. Face-to-face critique session during the student's presentation.

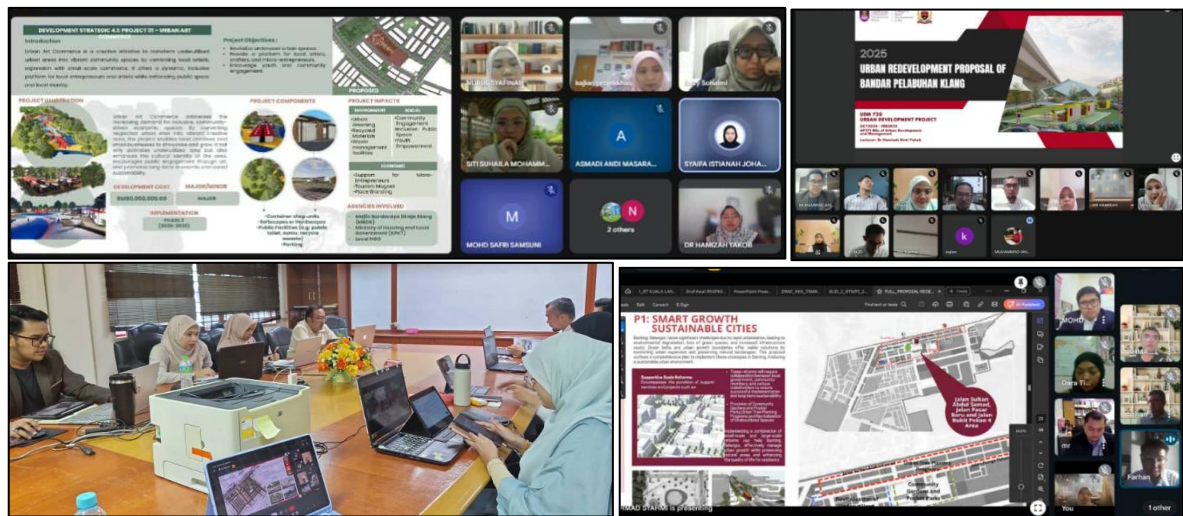


Figure 5. Briefing & Final presentation (online & hybrid session) with industry panel from local authorities in Klang, Shah Alam, and Kuala Langat



Figure 6. Site visit to Banting, Padang Jawa, Seksyen 15 Shah Alam, Port Klang and Pulau Indah, Klang

Regarding the key issues and challenges, the responses show that students sincerely appreciate the social dimensions of SBTL and recognise its role in enhancing collaboration, creativity, and engagement. There is a strong belief that both structured (group work, peer feedback) and unstructured (informal

discussion, social events) interactions are vital to developing communication and professional relationships. Meanwhile, in terms of panel and critique sessions, the comments indicate a desire for a balance between peer or lecturer feedback and real-world industry input, underlining the importance of bridging academia and industry practice. In addition, regarding time management, the data highlight the need for institutional curriculum design that serves diverse learner needs. SBTL is praised for its depth, but it must be paired with flexible scheduling, phased deadlines with clear milestones, frequent check-ins, and instructor-led workload-balancing strategies.

Regarding satisfaction with the six (6) aspects of the SBTL experience, the highest mean score was for the Studio experience (4.56), indicating that students valued the practical, hands-on learning approach. This supports the idea that SBTL is effective in helping students apply theory to real-world urban development challenges. Skill development also scored highly (4.52), suggesting the studio environment helped students build critical thinking, problem-solving, and design-related skills. Positive responses to clarity of assessment and the studio environment (both 4.48) show that students found the assessment process transparent and the studio setting supportive. Although feedback quality (4.44) and peer interaction (4.40) were slightly lower, the scores still reflect positive experiences. The lower rating for peer interaction may indicate a need for more structured group tasks or opportunities for collaboration. Improving peer engagement and feedback methods could further enhance the studio experience.

Therefore, most students are eager for a modernised, hybrid approach to studio learning. The strong support for balancing physical and online elements, alongside digital tools, signals a shift in expectations following the rise of e-learning. The high rating for the critique session structure suggests that students value transparent, constructive evaluation, which can be further enhanced through effective facilitation and clear expectations. Similarly, students are keen to gain exposure to industry practices, consistent with the vocational nature of urban development education. To summarise, the feedback strongly endorses a digitally enriched, professionally oriented studio environment while identifying opportunities to improve peer learning structures, feedback approaches, and assessment clarity. While the descriptive statistics provide a clear snapshot of the current state, they do not account for confounding variables or longitudinal changes that an inferential design might capture.

Conclusion

Based on students' feedback, several key recommendations are proposed to further strengthen the effectiveness of SBTL in the course code. Firstly, strong support for balancing physical and online learning calls for formalising and optimising hybrid teaching strategies. This includes integrating online collaboration platforms, online critiques, and virtual studio tools to complement face-to-face engagement. In addition, partnerships with urban development professionals, site visits, guest lectures, and mentorships should be embedded consistently to enhance real-world learning and professional readiness. Meanwhile, well-defined rubrics and structured critique sessions can be further developed to ensure fairness, clarity, and consistency. Creating structured opportunities for peer interaction, such as group critiques, peer reviews, and team-based design tasks, can support a stronger studio culture and deeper learning outcomes.

While this study offers valuable insights into students' perceptions of SBTL in the course, further research is recommended to deepen understanding and strengthen the pedagogical framework for postgraduate urban development education. A cross-institutional comparison could provide a broader perspective on the effectiveness of different studio models, assessment practices, and technological integration, particularly in postgraduate design education. Moreover, an in-depth qualitative approach, such as a focus group discussion (FGD) or an interview, could yield richer insights into students' experiences, motivations, and challenges within the studio environment. Further research could evaluate the perceptions of the lecturer or studio supervisor on the same topic to ensure it remains responsive to students' evolving needs.

The evolving expectations of postgraduate students underscore the need for a dynamic, flexible, and professionally oriented studio model. Implementing these recommendations will enhance the quality of design studio education and better equip students for real-world urban development challenges. To maximise the impact of postgraduate design studio education, institutions should align instructional goals with assessment practices, foster reflective dialogue, and equip educators with resources for consistent, innovative teaching. The adoption of a standardised assessment framework, the integration of digital tools for real-time feedback and collaboration, the provision of professional development workshops for studio instructors, and the encouragement of peer reviews and collaborative critique models are recommended. These descriptive insights provide an essential understanding of the SBTL experience among postgraduate students and can serve as a baseline for future hypothesis-driven research employing inferential or longitudinal designs.

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Author Contribution

H Yakob – drafting the initial manuscript, including conducting the investigation, designing the methodology, preparing study materials, and presenting the data. YA Abdullah – the study's conceptualisation and provided critical revisions to the manuscript. RN Raja Othman – final editing of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Declaration on the Use of Generative AI

Authors declare that Generative Artificial Intelligence (AI) tools, such as Grammarly, were used solely for language editing and grammatical refinement in the preparation of the manuscript. Grammarly was employed to check and improve writing quality and to paraphrase the manuscript text. No AI tools were used to generate ideas, conduct data analysis, interpret results, or develop the manuscript's arguments. The scientific content, analysis, and conclusions are entirely the author's original work.

References

- Butragueno, B., Grau, J. F. R., & Salgado de la Rosa, M. A. (2021). Rethinking the rules of engagement in virtual design studio classes. *ICERI Proceedings*, 1004–1011. <https://doi.org/10.21125/iceri..2021.0300>.
- Harinarain, N. & Haupt, T. C. (2016). Mission: Studio-based learning in construction. The University of KwaZulu-Natal case study. *Journal of Engineering, Design and Technology*, 14(1), 160–181. <https://dx.doi.org/10.1108/JEDT-05-2015-0031>
- Hepburn, L. A., & Borthwick, M. (2021). Synchronicity in the online design studio. A study of two cases. *Design and Technology Education: An International Journal*, 26(4), 71–85. <https://doi.org/10.24377/DTEIJ.article1166>
- Ilter, A. T. (2023). Design studio in a challenging period: Implications for a digitalised education. *GRID-Architecture Planning and Design Journal*, 6, 19–24. <https://doi.org/10.37246/grid.1112987>
- Izadpanah, S., Şekerci, Y., & Özkul, P. (2022). Evaluating the shift from physical to virtual design studios during the COVID-19 Pandemic: Exploring the second year's digital design development. *Turkish Studies*, 17(1), 41–60. <https://doi.org/10.7827/TurkishStudies.53896>
- Khan, A. R. & Thilagam, N. L. (2022). The virtual design studio and the key integrals. *Open House International*, 47(2), 316–337. <https://doi.org/10.1108/OHI-05-2021-0113>
- Komarzyńska-Świeściak, E., Adams, B., & Thomas, L. (2021). Transition from physical design studio to emergency virtual design studio. Available teaching and learning methods and tools – A case

study. *Buildings*, 11(7), 312. <https://doi.org/10.3390/buildings11070312>

Megahed, N. (2018). Reflections on studio-based learning: Assessment and critique. *Journal of Engineering, Design and Technology*, 16(1), 63-80. <https://doi.org/10.1108/JEDT-08-2017-0079>

Nespoli, O. G., Hurst, A., & Gero, J. S. (2021). Exploring tutor-student interactions in a novel virtual design studio. *Design Studies*, 75, 101019. <https://doi.org/10.1016/j.destud.2021.101019>

Nor Fariza Baharuddin, Nadzri Mohd Sharif, Syamsul Nor Azlan Mohamad, Fahmi Samsudin, Liza Marziana Mohd Noh, & Muhammad Nur Firdaus Nasir. (2025). Benefits and challenges of pedagogical approach on studio-based learning. *Environment-Behaviour Proceedings Journal*, 10(SI30), 35–40. <https://doi.org/10.21834/e-bpj.v10iSI30.6876>

Pavlou, V. (2024). Bringing the studio home: Fostering socially engaged arts education and sustainability in online learning. *Sustainability*, 16(23), 10406. <https://doi.org/10.3390/su162310406>

Peimani, N. & Kamalipour, H. (2022). The future of design studio education: Student experience and perception of blended learning and teaching during the global pandemic. *Education Science*, 12(2), 140. <https://doi.org/10.3390/educsci1202140>

Shariatrad, F., Dehbandi, R., & Makani, H. C. (2025). Virtual design studios in practice: A case study on overcoming pedagogical challenges. *International Journal of Technology and Design Education*, 35(3), 1123-1144. <https://doi.org/10.1007/s10798-024-09942-1>

UNSW. (2025). “Assessing studio-based learning”. <https://www.teaching.unsw.edu.au/assessing-studio-based-learning>.