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"Beyond the Classroom: Evaluating the Impact of Interactive Spaces on Student Learning."

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Abstract

This research investigates how students perceive and experience interactive learning spaces compared to traditional classrooms within educational campuses. Learning extends beyond the classrooms and occurs across the educational facility, including corridors, canteens, and roads. Educational facilities offer both formal and informal learning spaces. The term "formal learning space" refers to the spaces that support educational learning, such as traditional classrooms and lecture halls. The development of pedagogy: In the past few years, pedagogy has changed toward interactive and collaborative learning. Educational campuses are incorporating interactive spaces that promote flexibility, engagement, and collaboration among students in response to the changing pedagogical shifts. This study aims to evaluate whether these interactive spaces enhance learning experiences of students compared to outcomes relative to traditional classrooms through case studies, surveys, and observational analysis. The findings will provide insights into the role of architectural design in shaping educational experiences and future campus design strategies.

Keywords; *Interactive learning spaces, Traditional classrooms, Students experiences, campus architecture, Collaborative learning, Learning environment.*

INTRODUCTION

The learning environment plays a crucial role in shaping students' education, influencing not just how knowledge is acquired but also how collaboration and Creativity is encouraged. In recent years, educational campuses have evolved beyond the traditional model of classrooms and lecture halls to include interactive and informal spaces that support active learning and social engagement. These environments, such as studios, corridors, lounges, and outdoor areas, encourage interactions and peer-to-peer learning that extend beyond formal classroom settings. As pedagogy transitions from teacher-centred to approaches that prioritise students, architectural design plays an increasingly important role in encouraging student flexibility, communication, and collaboration. The integration of interactive spaces within educational campuses marks a significant change in campus architecture, reflecting a broader understanding that learning takes place throughout a network of physical and social places rather than just the classroom. Despite the growing importance of interactive learning environments, there is still not enough information on how students perceive and experience these spaces in comparison to traditional classrooms, especially in architectural colleges, where design and spatial awareness are essential components of education. While earlier research has looked into the impact of physical environment in promoting learning outcomes, few have looked into the balance between formal and informal learning spaces or how students perceive the value of interactive environments. This gap in understanding points out the necessity for research into the interaction between space design, educational techniques, and student engagement in architectural education. The primary research question guiding this study is: How do interactive spaces within architectural college campuses influence student engagement,

collaboration, and academic performance compared to traditional classroom settings? Answering this question can lead to a better understanding of how spatial design can improve or degrade learning experiences, providing valuable insights for architects, educators, and campus planners. To achieve this objective, the study has three main objectives: first, to identify the role of interactive spaces for enhancing student engagement, collaboration, and academic outcomes; second, to compare student perceptions of interactive spaces to traditional formal learning environments; and third, to investigate the physical, social, and technological characteristics of interactive spaces that contribute to effective learning. The interactive spaces of the campus landscapes can be described as ‘socially catalytic’ because they catalyse socialising and are key to fostering a sense of community and engagement (Oblinger, 2006, 1) [i]. How to design such a social catalyst becomes an important issue in the future of higher education environments. Existing research has demonstrated the significance and impact of the spatial design characteristics of learning environments upon student achievement (C. Kenneth Tanner, 2000, 1)[ii] (Great Britain. Commission for Architecture and the Built Environment, 2005, 1)[iii] and student experiences based on environmental behaviour theory. To achieve this aim, the study pursues three main objectives: first, to identify the role of interactive spaces in enhancing student engagement, collaboration, and academic outcomes; second, to compare student perceptions of interactive spaces with traditional formal learning environments; and third, to explore the physical, social, and technological characteristics of interactive spaces that contribute to effective learning. The scope of this research is limited to architectural colleges, focusing on interactive and informal learning spaces such as studios, lounges, corridors, libraries, atriums, and outdoor areas. It examines how these spaces support student collaboration and engagement by analysing both the physical design elements, such as spatial openness, furniture flexibility, and technology integration, and students' subjective experiences. The study's limitations include its reliance on selected case studies, which may not accurately represent all higher education institutions. Furthermore, because the results are based on student feedback, there is a risk of response bias, and the study focuses on immediate perceptions and usage patterns rather than long-term academic outcomes.

LITERATURE REVIEW

All of the researched literature emphasises how important informal and interactive learning spaces are becoming in higher education environments. Six essential

spatial features, like comfort, flexibility, functionality, spatial hierarchy, openness, and support facilities, were found to have a significant impact on learning behaviour and satisfaction by Wu et al. (2021), who examined student preferences and activities in informal learning spaces across two UK universities. (Xianfeng Wu Xianfeng Wu, Zhipeng Kou, Philip Oldfield, Tim Heath, Katharina Borsi, 11 June 2021, 2).

[iv] Similarly, Unlu et al. (2020) examined the spatial configuration of social spaces through space syntax analysis at Istanbul Technical University, finding that visually integrated, interpersonal areas promote peer interaction, while the sociofugal zones hinder engagement (Alper Ünlü, Erincik Edgü, Ali Tolga Özden, January 2001, 2) [v] Madkour (2019) expanded this discourse by linking pedagogy with architectural design, identifying adaptability, sensory stimulation, technology integration, and student-centred flexibility as key success factors for interactive educational environments. (Hoda Gad Al Rab Abdo Madkour, 2020, 2) [vi] All of this research supports the idea that learning happens outside of traditional classrooms in dynamic, flexible, and socially responsive environments that encourage collaboration and independent thinking. However, there is still a significant study gap in how students perceive interactive vs traditional learning environments, especially in the context of higher education in India. Most of the current research either concentrates on Western institutions or evaluates spatial arrangements more than user perception and behaviour. In order to close this gap, this research compares the value, effectiveness, and experiential quality of interactive learning spaces to traditional ones on Indian college campuses. By doing so, it will provide context-specific evidence and design insights to improve future educational environments.

Case Studies:

1. Amity University (Noida Sector-125)



Image 1. Central Courtyard of Amity University (Noida Sector-125)

Background: Ashok Chauhan, the founder of the Ritnand Balved Education Foundation founded Amity University. Amity was the first private university in India that implemented caste-based and other reservations for both students and teachers. When the educational institution first opened in 2003, there were 120 kids enrolled. It had 240 programmes and 80,000 students in 2011. More than 125,000 students from around the globe are now enrolled. The campus is 60 acres in size, with plenty of open space and lush greenery. With 130 programmes offered, ranging from diploma to PhD level of study, the university has 50,000 students overall. Additionally, the university has a 5,000-student capacity in its on-campus dorms, with separate blocks for male and female.

Interactive spaces in Amity University Hallways and Pathways in the Faculty:

- Routes include hallways and pathways connecting buildings and interior spaces.
- These routes are essential for movement and act as spaces that encourage interaction.
- Pathways of different sizes enhance spatial experience and promote student engagement.
- The building design integrates elements that support informal interaction among students.
- Cafeteria and Food Service Area:
- The faculty includes kiosks and food service areas
- These facilities serve students' daily meal needs.
- Beyond dining, they function as key social and interactive spaces for students.

Foyer

- The foyer (see Image 4) serves as another interactive space within the faculty.
- It adds variation to the building's spatial layout and breaks design uniformity.
- The foyer enhances the academic and social character of the building.

Sitting Areas

- Sitting areas are located along pathways and in building courtyards.
- They provide spaces for students to rest, talk, and interact while moving through the campus.
- Benches and landscaped features create a relaxing and comfortable environment.

Green and Open Areas

- Green spaces between blocks serve as recreation and sports areas.

- These open spaces encourage both active participation and social gathering.
- Seating platforms around trees provide informal spots for conversation.
- Facilities like swimming pools and basketball courts promote teamwork and student enthusiasm.

Inferences

- 1 Landscaping creates an inviting setting for interaction.
- 2 The cafeteria and food service area feature a central patio that acts as a gathering spot for students and an interactive environment.
- 3 Benches are provided along walkways between construction units to encourage interaction.
- 4 Limited gathering and meeting spaces create a sense of ownership among students.

2. Delhi Technological University



Image 2. Central Courtyard of Amity University (Noida Sector-125)

Background: Delhi Technological University (formerly Delhi College of Engineering), which operated from the Kashmiri Gate site in the heart of Old Delhi, was used until May 1989, when work began on the new site on Bawana Road. Moving operations from Kashmiri Gate to the new 164-acre campus on Bawana Road began in 1995, with classes for all four years of study beginning in 1999. The new campus is lush green and well-connected by road. The facilities include a library, a computer centre, a sports complex, eight boys' hostels, six girls' hostels, and a married couples' hostel.

The campus provides housing for professors and personnel. The property includes an auditorium and an open-air theatre.

b) Interactive spaces in Amity University Hallway and Pathway in the Faculty

Hallways and pathways act as important routes

connecting different buildings within the faculty. Besides facilitating movement, they enhance the spatial quality of the learning environment and offer opportunities for informal student interactions, making them vital interactive spaces.

Cafeteria and Food Service Area

Spread across 165 acres with around 4,000 students, the college has three canteens, two small outlets, and several kiosks. These food service areas not only cater to students' dining needs but also serve as social and interactive spaces where students can gather and engage informally.

Foyer

The foyer serves as a key interactive area within the faculty. It breaks the uniformity of the building design, creating spatial variation and enhancing the overall academic atmosphere by providing a space that supports academic and social interactions.

Sitting Area

Sitting areas located near the open-air theatre and building courtyards function as discussion zones for students. Surrounded by well-planned landscaping and benches, these spaces offer a calm and comfortable environment for relaxation and conversation.

Green and Open Areas

Green and open spaces around the blocks are used for sports, recreation, and landscaping. They provide venues for both active and passive engagement; students can participate in sports like cricket and athletics or use shaded sitting areas for discussions and socialising. The open-air theatre further adds to the interactive and communal spirit of the campus.

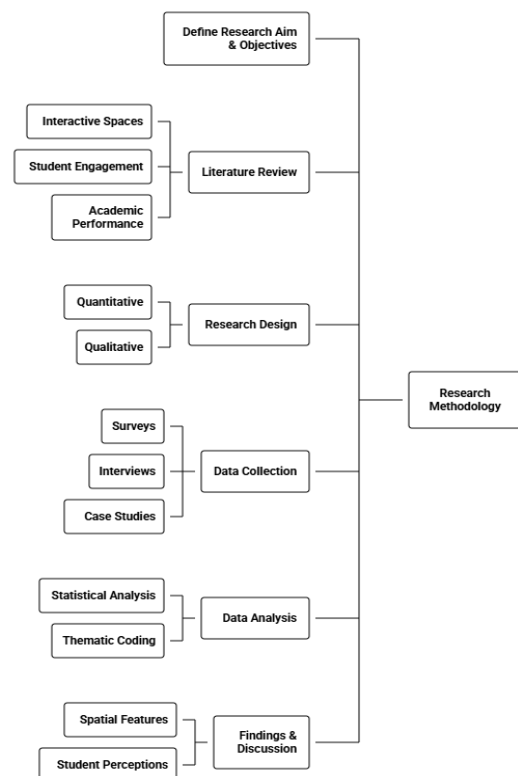
MATERIAL AND METHODOLOGY

This research adopts a mixed-methods approach to investigate how interactive spaces in architectural college campuses influence student engagement and academic performance, as well as how students perceive these spaces compared to traditional classrooms or lecture halls. The methodology begins with a literature review, focusing on previous studies related to interactive learning

environments, student engagement, and spatial design in higher education. Following this, the research design combines both quantitative and qualitative methods. The target population for this study consists of architecture college students aged between eighteen and twenty-five years. These students were chosen because their academic training emphasises spatial awareness and design thinking, making their perceptions of learning environments highly relevant. A stratified random sampling method was used to ensure diversity across academic years and gender. The final sample size comprised twenty students from four architectural colleges in Pune, Maharashtra, India, providing focused insights into how interactive spaces influence engagement, collaboration, and learning experiences.

In the data collection stage, three complementary methods are applied: (1) surveys to gather large-scale insights into student perceptions and usage patterns of interactive versus traditional spaces; (2) semi-structured interviews to gain deeper insights into student experiences and explore

Research Methodology: Interactive Spaces & Student Engagement



Flowchart 1. Research Design

how spatial design and interactivity influence collaborative learning and academic performance; and (3) online case studies of selected college campuses with interactive spaces. The online survey was conducted by circulating Google Forms among architectural college students in Pune, including Bharatiya Kala Prasarini Sabha's College of Architecture, MIT School of Architecture, SMEF's Brick School of Architecture, Trinity College of Architecture (TCOA) – KJEI's, and Ajeenkya D. Y. Patil School of Architecture.

Qualitative data from interviews and observations will be coded to identify common themes, while survey results will be analysed using basic statistical tools to find patterns and relationships. To gain a clear understanding of students' experiences, findings from surveys and observations will be compared and interpreted together. Finally, the findings will synthesise results to compare the effectiveness of interactive spaces against traditional classrooms, highlight key spatial features that promote engagement, and contribute to a deeper understanding of how students perceive the value and effectiveness of interactive spaces in relation to their academic and social experiences on campus.

Analysis:

The data analysis demonstrates that students have generally positive opinions of interactive learning spaces,

viewing them as necessary places that improve engagement, collaboration, and overall learning experiences. The majority of participants emphasised the flexibility and comfort of interactive environments, which allow students to tailor their study habits to personal preferences and group needs. Good lighting, ergonomic furniture, and modern design were often identified as contributing to increased concentration and motivation. In contrast, traditional classrooms were frequently criticised as restrictive, less engaging, and incapable of adapting to modern learning approaches. Students said that physical design aspects, notably lighting and furniture arrangement, had a substantial impact on their focus, energy, and involvement levels.

While the majority of replies were consistent with previous research proving the benefits of dynamic learning environments, a few participants noted issues such as overcrowding, noise, and limited space, which occasionally hampered the efficient use of interactive areas. Overall, the data indicate that interactive rooms outshine traditional ones by encouraging creativity, communication, and comfort. The study highlights the need of institutions to prioritise spatial design changes that incorporate comfort, aesthetics, and utility, ensuring that learning environments meet students' changing demands while also supporting their academic success and well-being.

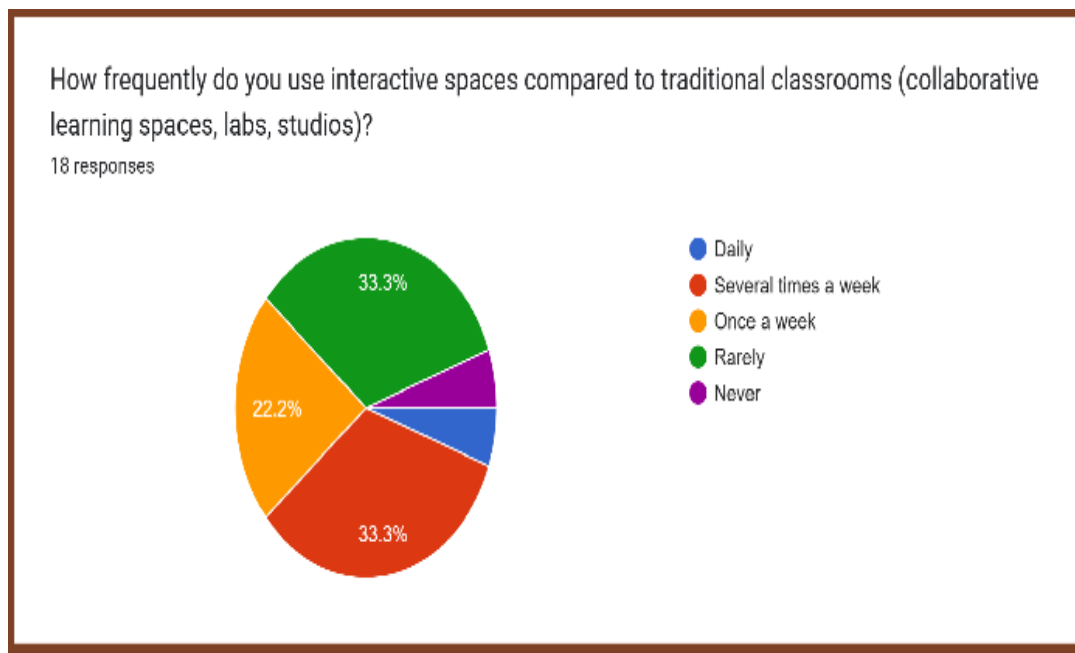


Figure 1. Frequency of Use: Interactive Spaces vs. Traditional Classrooms

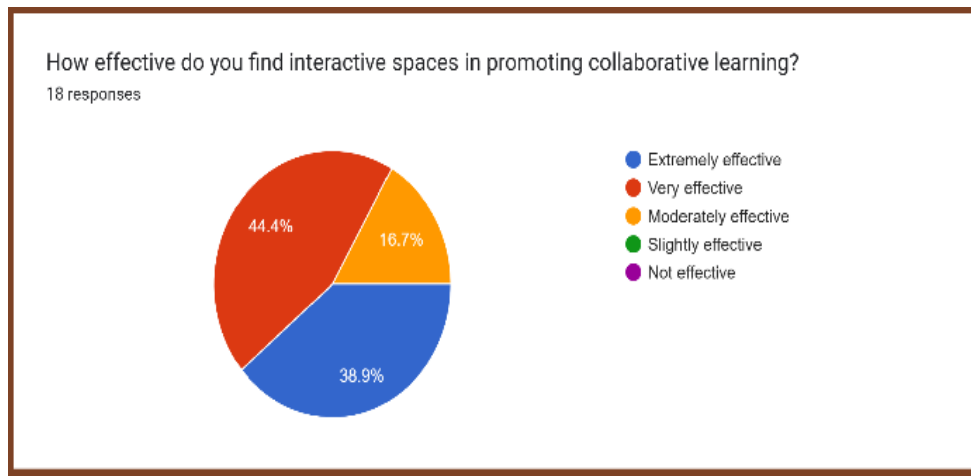


Figure 2. Survey Results on the Effectiveness of Interactive Spaces in Enhancing Collaboration

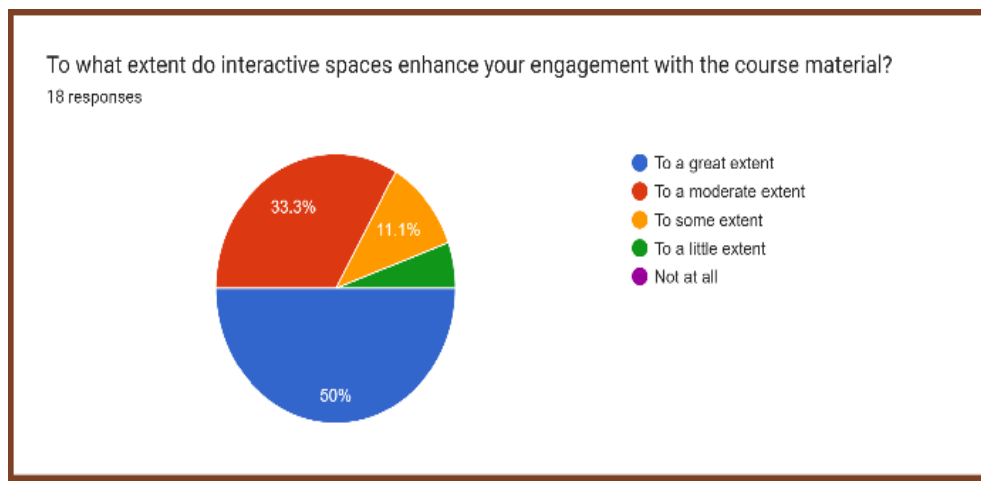


Figure 3. Survey Results on the Effectiveness of Interactive Spaces in Enhancing Collaboration

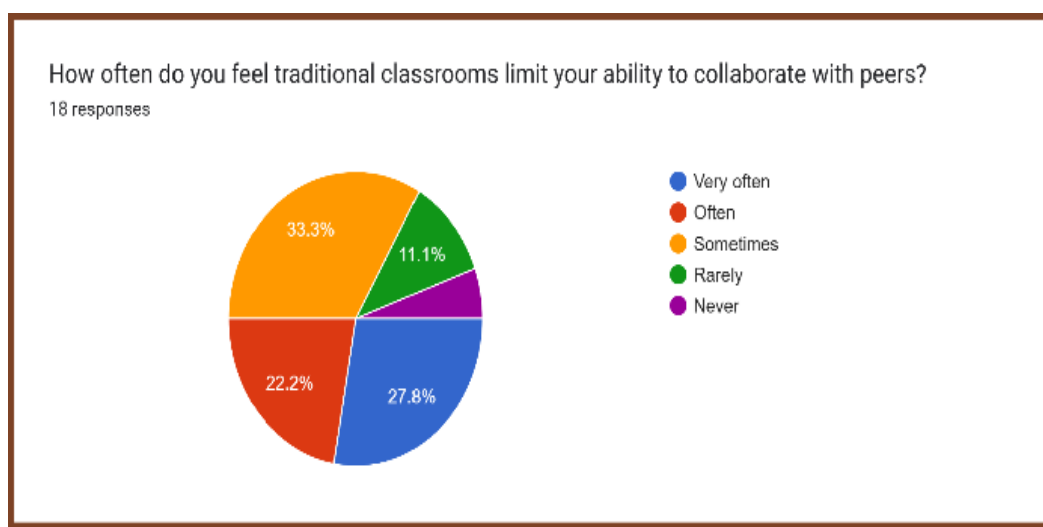


Figure 4. Frequency of Students Feeling Limited in Peer Collaboration within Traditional Classrooms

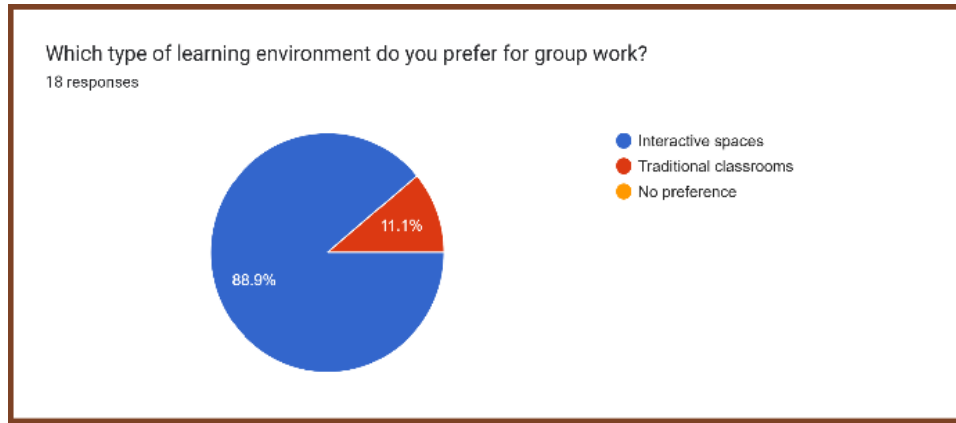


Figure 5. Comparison of Learning Environment Preferences for Group Activities

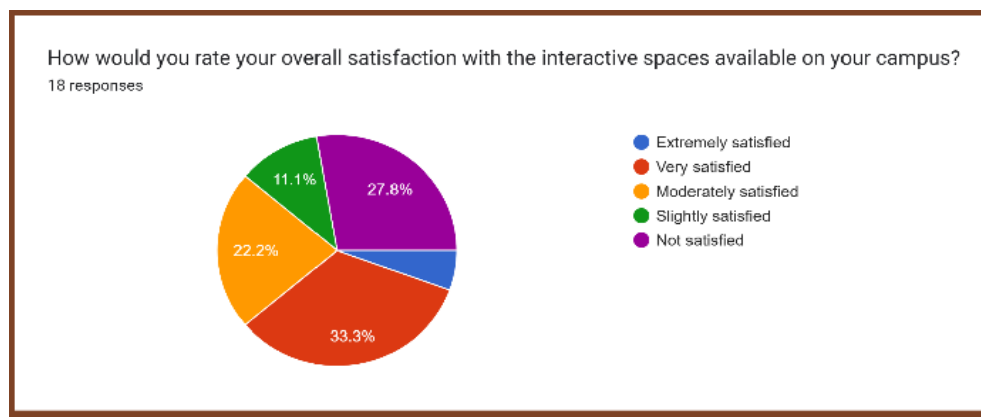


Figure 6. Campus Interactive Spaces: Student Satisfaction Survey

RESULTS AND DISCUSSION

The study examined students' perceptions of interactive learning spaces, focusing on how environmental factors such as lighting, acoustics, furniture comfort, and aesthetics affect their learning experiences. Most respondents were students aged 18–21, indicating a young academic population actively engaged in higher education. Overall, the findings revealed that students highly value well-designed interactive spaces that promote comfort, flexibility, and collaboration. Many emphasised the importance of adequate lighting, ergonomic furniture, and open layouts to create engaging and productive learning environments. Several participants mentioned discomfort due to inadequate seating and limited space, which hindered concentration during extended study sessions. Others reported the absence of designated interactive areas in their institutions, highlighting inequality in access to such environments. These findings align with previous studies suggesting that physical environments directly influence student engagement, satisfaction, and performance (e.g., Cheryan et al., 2014). The preference for flexible layouts and modern aesthetics also supports

research advocating user-centred and adaptive learning spaces.

Unexpectedly, a few students expressed minimal concern about acoustics or colour schemes, suggesting these factors may be secondary to comfort and functionality. This contrasts with some prior findings that highlight the psychological impact of visual and auditory elements on learning. Such divergence could be due to varying exposure to well-equipped environments or differing personal priorities among students.

Overall, the results confirm that thoughtfully designed interactive spaces contribute significantly to students'

academic and social experiences. The justifications provided emphasise that comfort, accessibility, and adaptability foster better collaboration and engagement. Therefore, institutions should invest in ergonomic furniture, improved lighting, and flexible layouts to enhance both well-being and learning outcomes. The study supports existing literature while identifying areas where student

perceptions deviate, offering valuable insights for future design improvements in campus learning environments.

CONCLUSION

This research highlights that interactive learning spaces significantly enhance student engagement, collaboration, and overall learning experiences compared to traditional. The findings show that well-designed spaces with flexibility, comfort, and accessibility promote creativity and peer interaction, supporting the developing pedagogical movement towards student-centred learning. While the study's sample size and concentration on certain architecture colleges have some limitations, the findings highlight the relevance of spatial design in affecting academic and social outcomes. Institutions should prioritise flexible furniture, adaptable layouts, and well-lit, inclusive spaces in order to foster active learning and well-being. Future research could look into long-term academic performance effects, cross-disciplinary applications, and the function of digital integration in interactive settings. Finally, this study highlights how educational architecture must transcend functional boundaries in order to foster a holistic and collaborative learning culture, spanning the gap between formal education and informal collaboration.

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Images:

Image 1.

https://upload.wikimedia.org/wikipedia/commons/thumb/a/a0/Amity_University_J_Block.JPG/1200px-Amity_University_J_Block.JPG?20120202170128

Image 2.

<https://d13loartjoc1yn.cloudfront.net/upload/library/1751564032du.webp>

Figures:

Figure 1. By the author

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Figure 3. By the author

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Figure 5. By the author

Figure 6. By the author

Flow chart:

Flow chart 1. By the author