

Management Principles of Collaboration-Based Classroom Settings in Interactive Learning

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Article history

Submitted: 2026/04/10; Revised: 2026/05/20; Accepted: 2026/06/01

Abstract

The 21st-century learning paradigm demands a shift from a teacher-centered model to a student-centered one, emphasizing collaboration and interactivity. However, this pedagogical transformation is often not accompanied by a restructuring of the physical classroom environment. Rigid and static classroom settings actually become a major obstacle to the creation of collaborative dynamics. This article aims to examine and formulate the principles of classroom settings based on collaboration and interactive learning. This research uses a library study method with a descriptive-analytical approach. Data sources are obtained from literature related to learning environment design, collaborative pedagogy, and environmental psychology. The study results formulate six main principles, namely: Spatial Flexibility, Visibility and Accessibility, Availability of Flexible Learning Zones, Technology Integration, Support for Student Autonomy, and Stimulating Aesthetics. The application of these principles has been theoretically proven to increase active participation, facilitate group work, and create a sense of ownership and psychological comfort for students. In conclusion, the classroom setting is not merely a decorative element, but a strategic pedagogical component that must be consciously designed to realize the goals of interactive and collaborative learning.

Keywords

Classroom Setting, Collaborative Learning, Interactive Learning Environment



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INTRODUCTION

A comfortable, safe, and engaging learning environment is one of the main factors influencing the success of the learning process in schools. A good classroom layout can create a conducive atmosphere, making students feel more comfortable and motivated to learn. Therefore, room layout is not merely a matter of aesthetics, but a crucial aspect for achieving learning objectives effectively and efficiently.

Classroom layout encompasses various aspects, from the placement of furniture and equipment to decorations that support an innovative and enjoyable learning atmosphere. A good layout will facilitate teachers in managing learning activities, monitoring students, and

using various learning media as needed. Furthermore, the right layout can also foster a sense of ownership, discipline, and responsibility in students for their own learning environment.

In practice, classroom layout must consider aspects such as the size and shape of the classroom, the number of students, and student characteristics. For example, arranging desks and chairs in groups can encourage collaboration and discussion among students, while the placement of the whiteboard and teaching materials must be easily accessible and visible to all students. Health aspects such as lighting and ventilation must also be considered to ensure a healthy learning environment and support the learning process, given that physical health directly impacts student concentration and performance (Harahap, 2025).

In the modern education era, it is increasingly important to pay attention to optimizing student interaction in the classroom. Effective interaction between students not only improves academic achievement but also plays a crucial role in the development of social and emotional skills. Studies have shown that classroom environments that support collaboration and active interaction can create more meaningful and satisfying learning experiences for students (Rasad et al., 2024).

Creating a learning environment that supports collaboration and communication between students is key to optimizing classroom interaction. An inclusive and open environment allows students from diverse backgrounds to feel accepted and supported in their contributions to learning. This not only strengthens relationships between students but also increases their confidence when exchanging opinions and ideas. Therefore, a deeper understanding of how these strategies can be effectively implemented in educational settings will help design classroom environments that encourage student-centered learning and achieve optimal learning outcomes (Rasad et al., 2024).

Based on this background, the research question in this article is: What are the fundamental principles for designing classroom settings that support collaborative and interactive learning? How can these principles be implemented to create a learning environment that is responsive to students' needs?

The urgency of this paper lies in the need to bridge the gap between modern pedagogical theory and classroom design practices. Often, schools invest heavily in technology but neglect to reimagine the physical environment, which serves as the medium for interaction between technology and humans. The purpose of this paper is to formulate a conceptual guide in the form of principles for collaborative and interactive classroom settings that can serve as a reference for educators, educational designers, and policymakers in schools.

METHODS

This research employed a library research method with a descriptive-analytical approach. Data sources were obtained from books, scientific journals, and credible articles discussing classroom design, school architecture, environmental psychology, and collaborative pedagogy, published between 2015 and 2025.

Data collection was conducted through documentation, namely searching, collecting, and recording relevant literature. Data analysis employed a content analysis model, which included: (1) data reduction by sorting information according to research themes, (2) data presentation in the form of thematic descriptions, and (3) drawing conclusions that formulated the principles of collaborative classroom settings.

FINDINGS AND DISCUSSION

Based on the literature review, six main principles were identified in classroom settings that support collaborative and interactive learning. These principles are summarized in the following table:

Table 1. Principles of Collaborative and Interactive Learning-Based Classroom Settings

No	Principle	Description	Practical Implementation
1	Spatial Flexibility	The classroom should be easily reconfigured according to learning needs (lectures, group discussions, presentations).	Using lightweight desks and chairs that are easy to move, furniture with wheels, and mobile storage shelves.
2	Visibility and Accessibility	All students should be able to clearly see the teacher, whiteboard, and classmates. Access to learning resources (books, stationery) should be easily reachable.	Circular or semi-circular seating arrangements, open bookshelves, and wide, unobstructed traffic paths.
3	Flexible Learning Zones	Providing areas with different functions within one classroom.	Group discussion areas, quiet reading areas, project areas, and presentation spaces.
4	Technology Integration	Technology is not treated as a separate element but is seamlessly integrated into classroom design.	Screens/monitors for small groups, sufficient electrical outlets, interactive whiteboards, and device charging areas.
5	Support for Student Autonomy	Providing students with opportunities to personalize and organize their own learning environment.	Student work display boards, student-decorated reading corners, and personal storage spaces.
6	Stimulating Aesthetics	The use of colors, lighting, and natural elements that create a comfortable atmosphere and enhance learning motivation.	Maximizing natural lighting, warm wall paint colors (not overly striking), ornamental plants, and educational posters.

Flexibility as the Foundation of Collaboration

Spatial flexibility is a concept in architecture that refers to the ability of a space to adapt to changing needs, functions, and environmental conditions over time. According to Schneider & Till (2005), flexibility means that a space does not merely serve a single fixed function, but is designed to accommodate changes in use without requiring major renovations. This concept emerged from the awareness that human needs and technological developments continue to evolve; therefore, buildings must be capable of responding adaptively to these changes (Krisbiantoro & Fitriyanto, 2025).

The principle of flexibility is at the core of collaborative classrooms. Static classrooms with rows of desks only support one interaction model, namely teacher-student interaction. With flexible furniture, teachers can quickly transform the classroom from presentation mode into group discussion mode. This aligns with learning environment theory, which states that spaces should be responsive to users' activities. Flexibility also conveys the implicit message that learning is dynamic and adaptive.

Visibility and Accessibility

Circular or semi-circular seating arrangements (the principle of visibility) ensure that every student can maintain eye contact with other classmates. This is crucial for building communication and a sense of togetherness within groups. Marx et al. (2000) found that U-shaped layouts encourage participation from all students, facilitate better interaction between students and teachers, and allow students to clearly see the teacher. On the other hand, Johnson and Johnson (1994) revealed that clustered seating arrangements support cooperative learning, enhance student collaboration, and encourage active involvement in group discussions (Noviana & Ichwanto, 2025).

Flexible Learning Zones

This strategy involves dividing the classroom into several learning zones or areas, such as discussion zones, reading zones, or presentation zones. This arrangement provides students with the flexibility to learn according to their needs and learning styles. Flexible classrooms also make it easier for teachers to implement various instructional methods, including project-based learning, group discussions, and small-scale experiments. This supports the creation of a more active and participatory learning environment (Nurista, 2025).

Technology Integration

Today, the integration of technology in education has triggered a shift in priorities across various aspects of the learning process, ranging from changes in educational management systems and teaching strategies to students' learning patterns. Digital transformation has changed the teacher's role from merely delivering material to becoming a facilitator who is capable of utilizing technology in teaching and learning processes. The use of information and communication technology in learning significantly contributes to improving educational quality, expanding access to learning, strengthening students' understanding of abstract

concepts, and presenting learning materials in more representative and engaging ways (Rosyidah et al., 2025).

Support for Student Autonomy

Providing structured autonomy is a core practice in the Project-Based Learning (PjBL) model and is essential for fulfilling students' psychological needs. Autonomy-supportive teaching by teachers has been proven to positively affect students' learning and motivation. In the context of Project-Based Learning, when students are given full freedom to design projects and organize tasks, they become independent individuals who are actively engaged and responsible for their learning experiences. The teacher's role in providing opportunities for freedom and encouraging exploration is a crucial element in building a strong sense of ownership and responsibility (Khasanah, 2025).

Stimulating Aesthetics

An aesthetic and comfortable environment significantly affects students' psychological well-being. Proper lighting, especially natural light, reduces eye strain. Green plants can lower stress levels and improve concentration. Classrooms that support creativity, such as those using bright colors, flexible spaces, and technological facilities, positively influence student motivation. These environments provide students with the freedom to explore and collaborate with their peers, thereby creating a conducive atmosphere for learning (Issalillah et al., 2024).

The findings of this study indicate that effective collaboration-based classroom settings are not determined by a single design element but by the synergistic interaction among six core principles: spatial flexibility, visibility and accessibility, flexible learning zones, technology integration, support for student autonomy, and stimulating aesthetics. These principles collectively function as environmental conditions that facilitate social interaction, collaborative knowledge construction, and active learner engagement. From the perspective of sociocultural learning theory, knowledge is constructed through interaction and participation within a social context rather than through individual cognitive processes alone. Therefore, classroom spaces that encourage communication, mobility, and shared problem-solving naturally support deeper learning experiences. This finding is consistent with the work of Kariippanon et al. (2021), who found that flexible learning environments significantly increase behavioral engagement and collaborative participation among secondary school students. Similarly, Mahat et al. (2022) concluded that innovative learning environments positively influence student outcomes because they enable diverse pedagogical practices and foster learner agency. However, this study extends previous findings by arguing that flexibility is not merely a spatial characteristic but a pedagogical strategy that communicates an institutional commitment to adaptive and student-centered learning. The effectiveness of flexible classrooms occurs because physical environments influence behavioral patterns; when students can easily reorganize space according to learning needs, they become more active participants in constructing learning experiences rather than passive recipients of instruction.

Another significant finding concerns the role of visibility, accessibility, and learning zones in shaping collaborative dynamics. The literature synthesis demonstrates that classroom

layouts promoting visual connectivity and ease of movement enhance interpersonal communication and reduce psychological barriers among learners. This finding supports environmental psychology theory, which suggests that physical arrangements influence social behavior by either facilitating or constraining interaction opportunities. Previous studies by Brooks (2021) and Cleveland and Fisher (2022) similarly reported that classroom design affects the frequency and quality of student participation because spatial organization determines how learners perceive accessibility to peers, teachers, and learning resources. Nevertheless, this study identifies a more nuanced relationship between classroom design and collaborative learning. Rather than viewing visibility solely as a logistical factor, the analysis suggests that visibility contributes to the creation of social presence, a condition in which students feel acknowledged and connected within the learning community. Likewise, flexible learning zones do not simply accommodate different instructional activities; they symbolize recognition of diverse learning preferences and cognitive needs. This finding partially differs from earlier studies that emphasized functionality and efficiency as the primary objectives of classroom design. Instead, the present study argues that classroom settings also carry symbolic and psychological meanings that influence students' sense of belonging, confidence, and willingness to participate in collaborative learning activities.

The study further reveals that technology integration, autonomy support, and stimulating aesthetics are critical in sustaining interactive learning environments because they address students' motivational and psychological needs. Consistent with Self-Determination Theory, environments that provide autonomy, competence support, and meaningful engagement tend to enhance intrinsic motivation and learning persistence. The findings corroborate Bond et al. (2024), who reported that educational technology contributes positively to student engagement when integrated into pedagogical activities rather than functioning merely as a technological add-on. Similarly, Imms et al. (2023) found that innovative learning environments encourage changes in teaching practices toward more collaborative and student-centered approaches. However, the present study highlights that technology alone does not transform learning; its effectiveness depends on how it is embedded within a broader ecosystem that promotes autonomy and meaningful interaction. Furthermore, the role of aesthetics emerged as more significant than commonly assumed in educational management literature. Natural lighting, comfortable colors, greenery, and visually stimulating environments contribute to psychological well-being, which in turn supports concentration, creativity, and collaborative behavior. This finding aligns with Barrett et al. (2020), who demonstrated that physical environmental quality directly affects learning outcomes. Scientifically, these findings imply that classroom management should be reconceptualized beyond administrative organization and behavioral control. Instead, classroom settings should be understood as strategic pedagogical infrastructures capable of shaping social interaction, learner motivation, and collaborative knowledge construction. Consequently, the study contributes to the growing body of literature on learning environments by proposing a holistic framework that integrates spatial design, educational

technology, environmental psychology, and collaborative pedagogy into a unified conceptual model.

CONCLUSION

Classroom setting is not a trivial matter related only to the aesthetics of the space. It is a pedagogical instrument that has the power to shape or hinder interaction and collaboration. The six principles formulated: Flexibility, Visibility & Accessibility, Flexible Learning Zones, Technology Integration, Autonomy Support, and Stimulating Aesthetics offer a framework for transforming static classrooms into vibrant, dynamic learning ecosystems that are responsive to the needs of 21st-century learners. By adopting these principles, educators not only organize space but also actively cultivate collaboration and interactivity in everyday learning.

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