

Developing Quality Learning Environments - A comparison study

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Abstract:

This paper explores the essential elements of developing excellent learning environments, especially as they relate to design education. It highlights how important well-designed interiors are for increasing functionality, encouraging creativity, and having a good impact on students' attitudes and behaviors about their academic endeavors. The study does a comparative investigation of several elements influencing the effectiveness of course delivery, classroom layouts, and students' emotional reactions to classroom designs. The significance of educational surroundings in supporting efficient teaching and learning experiences is emphasized in the introduction. It outlines the elements of a supportive learning environment, including its educational, psychological, and physical aspects. The study also emphasizes the importance of color psychology and space perception in interior design, explaining how these factors affect people's perceptions and behaviors in learning environments.

The problem statement identifies common issues with classroom design, like poor ventilation, dull lighting, and awkward seating arrangements, that negatively impact both teachers' and students' experiences. These shortcomings highlight how critical it is to use human-centered design strategies that put utility first and encourage participation in learning environments. The declaration emphasizes how crucial it is to solve these problems and how important it is to create settings that support efficient teaching and learning. It highlights how important it is to use design principles that put utility first, encourage student engagement, and support effective instruction in order to address current issues and improve learning outcomes as a whole.

The objectives of the study provide a broad framework for the exploration of optimal learning environments, including functional improvement, student involvement, academic achievement, accommodating a range of learning needs, and promoting teacher efficacy. All of these goals work together to maximize the learning process for instructors and students. Finding critical insights into the relationship between design features and educational outcomes, the study explores how classroom layouts affect students' emotional responses and the effectiveness of course delivery. By shedding light on the ways that classroom design affects teaching and learning dynamics and ultimately directing the creation of solutions to promote more inclusive and effective learning environments, this investigation contributes to the overall goals.

The review of the literature summarizes the results of numerous studies on the design of classrooms, covering topics such as integrating smart classroom technologies, improving indoor air quality, and applying Universal Design for Learning (UDL) principles. Every study provides insightful information about pedagogical, technological, architectural, and ergonomic factors to be taken into account when creating learning spaces that support efficient teaching and learning. In order to maximize students' educational experiences and outcomes, this study emphasizes the complexity of designing high-quality learning environments and the significance of taking a variety of aspects into account, from pedagogical approaches to physical design features.

Keywords:

Learning environments, Classroom design, Interior design, Educational psychology, Student engagement, Academic achievement, Universal Design for Learning (UDL), Smart classrooms, Emotional impact, Course delivery efficiency

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I. Introduction

Schools, colleges, universities, and institutes are examples of educational institutions whose primary objective is to transmit information to individuals. As a result, these institutes are accredited by the state or its equivalent authority. Students study in authentic environments and cultures. College policy and governance are also regarded educational environment characteristics. A loving, healthy learning environment for students includes psychological safety, a positive self-image, feelings of belonging, meaningful activities, and a sense of personal competence. (Peter Barrett, Fay Davies, and Yufan Zhang; Lucinda Barrett, 2015).

Learning environments are grouped into three types. Examples include the physical environment, psychological setting, and instructional setting, all of which are referred to as categories or regions. Overall, factors such as reduced distractions, a clear schedule, an enjoyable atmosphere, and a range of instructional methods and styles have all been found to increase performance and assist successful learning (Closs, L., Mahat, M., & Imms, W., 2022).

Place awareness involves identifying a space's value, function, form, size, and proportions. Additionally, color affects how one perceives space, accessibility, complexity, and structure in interior design (Savavibool & Moorapun, 2017). Recognizing the impact of color on space allows designers to create layouts effectively and meet the requirements of their users (de Abreu, M. S., Giacomini, A. C., Genario, R., Dos Santos, B. E., Marcon, L., Demin, K. A., & Kalueff, A. V., 2020).

The classroom is the most essential location in a college; Students and teachers engage in a variety of activities and spend a substantial amount of time in this diverse setting. Superior design improves the learning environment's performance and helps users feel more comfortable in the designed space (Obeidat and Al-Share, 2012). Many investigations have looked into how color impacts various aspects of interior design, including the wall, furniture, floor, and environment. Numerous earlier studies looked at how color affects different perception areas. Savaibool & Moorapun's 2017 study found that depending on the dimensions of a room, different colors might affect people's perceptions differently. In the office, neutral colors go nicely with items of all sizes, but both use and attractiveness should be considered. Conversely, warm and cool hues convey a reverse message, making some of them inappropriate to use in compact settings where they might create a negative response. However, they can be used in medium-sized and proportion spaces, so choose your color combinations carefully. (Savavibool & Moorapun,

2017). Furthermore, Yildirim et al. (2015) found that the placement of numerous colors on campus walls has an effect on male students' sensory effectiveness. In an investigation of 3 distinct colors—blue, pink, and cream—students' perceptive ability was assessed in an adult male high school classroom. The white and pink walls received lower ratings than the blue wall. Particularly, the same hue group was used in previous study as well as the current inquiry. (Yildirim et al, 2015.)

Problem statement

Interior design should meet the fundamental needs to enhance the efficiency, health, and happiness of places such as classrooms for teachers as well as students. However, interior classroom difficulties such as inadequate lighting, loudness, brightness, poor air quality, improper temperature, dissatisfied seats, as well as fixed seating arrangements are hard to overcome.

The primary location in an educational institution is the classroom. The setting is affected by a variety of variables, such as mental, social, cultural, and physical ones. Because it is a space where both students and teachers spend a significant amount of time, it is thought to promote a level of focus suitable for educational activities like communicating, researching, sketching, writing, coloring, and practicing. When creating the surroundings for classrooms, designers should give adequate consideration to environmental factors. They ought to foster a human-centered environment that supports teaching and learning while increasing the efficiency of educators as well as learners (Rydeen, J. E. 2003). Classroom sizes and functions vary depending on the intended learning and instructing activities. As an instance, lectures may necessitate a different setting than other evidence-based educational practices. Instruction, presenting, and practicing interior design tasks require a specialized context. Since that encourages academic and social engagement and develops students' passions and inquiries, the design-studio room is the most crucial location for educating interior design and architecture (Obeidat, A., & Al-Share, R., 2012.). One depiction of such a learning environment is a setting where professors supervise students as they work on assignments. Its space can accommodate up to twenty pupils working together; Everyone has their own drafting table, tools, and other educational resources. Moreover, the design studio classroom might be used as:

(a) a setting for learning that fosters the instruction and exploration of interior design within scheduled class times,

(b) a setting for learning that enables students majoring in interior design to complete independent projects during their free time, and

(c) a classroom setting that can accommodate both ideas at once; students can work on their individual projects while others are taking part in a class. These kinds of educational environments might see a lot of use from students who are studying interior design.; as a result, these classrooms should support these goals and offer settings that are conducive to these various activities. (Obeidat, A., & Al-Share, R., 2012).

II. Literature Review

A literature review is conducted to explore the strong relationship between the classroom environment and students' academic achievement. In this study, an experiment was conducted in a created classroom environment to be used as an evaluation instrument to allow the students that took part in the experiment to grade their learning environment and how users perceive the design-studio classroom environment and how well users believe it satisfies their aims and objectives. The good interior design improves more than just functionality The quality of such a classroom process as well as the consumers' confidence in the educational process simultaneously enhance with good interior design.

- 1- Jebрил Tawfiq and Chen Yang, 2020. The architectural design of classroom space for intellectually handicapped kids is compared to the design criteria of primary school classrooms for both intellectually disabled and healthy students. Examine the architectural variables that must be assessed in this setting, including the classroom layout, flooring materials, restrooms, transition area, foldable furniture, insulation, air circulation, lighting, colors, and sunspace. The study's findings give five major architectural methods involving the space and environment of the classroom, covering furniture, neighboring bathrooms, colors and materials, form, lighting, ventilation, and quiet music utilized by reasoned (Jebрил, T. and Chen, Y., 2021).
- 2- Lee Flager Forest, Haymaker John, and Welle Benjamin, 2009. One key challenge is the restricted capabilities of the AEC industry's methodology and technological innovation. And how PIDO may enhance the amount of design cycles completed in practice using orders of scale, as well as evaluate PIDO's capacity to improve AEC MDO methodologies and products. The investigation also includes a test implementation of PIDO to an AEC case study: the MDO of a classroom design for

architectural and energy-efficiency improvements, which was completed using the conventional technique (Flager, F., Welle, B., Bansal, P., Soremekun, G., & Haymaker, J., 2009).

- 3- Davar Pishva and G.G.D. Nishantha, 2008. The innovations utilized in smart classrooms for distance learning are divided into four categories and reviewed in terms of the methodologies employed and how they have been applied. It also covers how several of the method's inherent flaws are solved, in addition to the physical and practical limitations of the various classroom design for a successful distant lecture situation. Their finding reveals that an analogous structure can be extended to a framework in that a single local the classroom can simultaneously respond to the requirements of a number of distant classrooms, providing an achievable answer for certain of the technical challenges encountered across various classroom design implemented via the approach of deductive reasoning (Pishva, D. & Nishantha, G. G. D., 2008).
- 4- Yu Yanzhe, Wang Bei, You Shijun, and Ye Tianzhen, 2021. Enhancing indoor air quality (IAQ) in college classrooms, as well as simulating the impacts of floor level, classroom orientation, and interior window height, utilizing a descriptive statistical approach. Yu, Y., Wang, B., You, S., Ye, T., Zheng, W., Wei, S., and Li, K. (2022) also investigated the impacts of manual airing tactics and building components on indoor air quality in classrooms. (Yu, Y., Wang, B., You, S., Ye, T., Zheng, W., Wei, S., & Li, K., 2022).
- 5- Anna Courtad Carrie, 2019. Universal Design for Learning (UDL) is based on three principles: representation, research into the development of programs that allow students of all levels to "join" the learning process, and serves as a catalyst for including all students in the learning procedure. The study also includes a history of UDL, a description of the advantages that exist for students who have disabilities when using the UDL framework in the classroom, and technologies to assist in adopting UDL for specific learning activities using the deductive method (Courtad, C. A, 2019).
- 6- Alfoudari Aisha, Durugbo Christopher, and Aldhmour Fairouz, 2021. Smart classrooms suggest concepts and approaches to improve socio-technological integration; yet, knowledge of the socio-technological problems of smart classrooms is inadequate. These papers address technological concerns connected to developing learning environments and combining

analytical tools, conceptual frameworks, and social media technologies.

Furthermore, the results of the investigation suggest possible paths for future research regarding the fields of smart classroom design for continuity and uniformity, the quality characteristics of smart classrooms, the efficacy and long-term viability of smart classroom infrastructure, and the development of a process model for smart classrooms using social survey techniques. (Alfoudari, A. M., Durugbo, C. M., and Aldhmour, F. M, 2021).

- 7- John Marx (2000). The setup of the studio and material production and how The practical application of theory and critique should be the fundamental goal of studio instruction and synthesis. This division ought to enable the student to focus on digital design as an extensive method, starting with the original massing studies and terminating with high-quality presentation drawings. Their results include the present dearth of uniformity when teaching digital design, as well as the expense to architectural departments of offering software and hardware that is adequate to have a computer on each studio workspace using the approach of deductive reasoning (Marx, J., 2000).
- 8- Ismail Mohd, Mahmud Rosnaini, and Hassan Isham, 2012. The impact of employing a digital studio on architecture diploma students when practicing the designing procedure versus using a traditional studio. And examine the digital design technique that may generate more complicated and exciting design ideas utilized by the students were split into two groups, one group engaged in design activities employing digital studio and an additional group engaged in design tasks using conventional techniques (Ismail, M. A., Mahmud, R., & Hassan, I. S., 2012).
- 9- Al-Hinai Nasr, Al Kindi Mahmood & Shamsuzzoha Ahm, 2018. Students regard the design and engineering of an ergonomic chair as vital to its functionality and comfort. To address all of the students' essential classroom needs, the study employs evaluation and analysis to propose a novel ergonomic chair design and engineering. After just being used by the students, the suggested chair was tested, confirmed, and enhanced based on their comments. This study's findings are ended using limitations of the study and future research objectives using the community questionnaire technique (Al-Hinai, N., Al-Kindi, M., & Shamsuzzoha, A. 2018).

III. Objectives

The goal of this study is to provide an ideal learning environment that enhances student involvement, motivation, and academic accomplishment. The procedure of designing classroom layouts for learning environments ought to be influenced by a number of particular research objectives:

1. Enhance classroom functionality: The research aims to find optimal classroom arrangements for efficient instruction and learning. This could involve assessing seating layouts, lighting, and acoustics.
 2. Boost student engagement: The investigation explores how classroom setups can increase engagement. Considerations include classroom design, the usage of technology, and the introduction of learning environments that are collaborative.
 3. Increase academic achievement: This investigation examines how classroom configurations impact outcomes for learning. Also, look into the effect of the setting on how students learn, as well as how different arrangement of classrooms impact student conduct, focus, and ability to learn.
- Promote instructor performance: The study examines how classroom layouts impact instructor productivity. This includes looking into how classroom design affects interactions between students and educators, teacher behavior, including strategies for learning. (Oliveira S., Tahsiri M., and Everett G., 2022).

Below represent specific research aims that might contribute to the ultimate goal of investigating the impact of classroom layouts on course delivery efficiency.

1. Determine the most successful classroom layouts: This study examines the way various layouts impact course delivery efficiency. Considering alternative seating configurations, lighting, and acoustics to determine the most successful layouts.
2. Examine the effect of classroom design on behavior among students. Also, investigate how various classroom layouts influence student involvement, engagement, and academic performance.
3. Assess the influence of classroom layout on teacher conduct: This study examines how classroom design influences instructor behavior in the learning environment. This includes investigating how diverse layouts of classrooms impact interactions between educators and students, educational techniques, and management of classrooms.

4. Evaluate the consequences of classroom design on course learning results. Also, investigate how various classroom layouts effect retention of students, comprehension of the content, and general academic achievement.
5. Research reveals optimal procedures for classroom design to improve course delivery effectiveness and learning outcomes. Standards for the layout of classrooms should reflect the requirements of students, teachers, and the material being taught (Healey & Mick, 2022).

Research aims for studying the emotional effect of classroom layout on student attitudes and actions may include:

1. Determining classroom design factors that impact student moods, including lighting, color, furniture, arrangement, and decorating.
2. Examine how classroom design affects students' emotional states, such as tension, anxiety, and engagement.

3. Investigate how classroom design affects student behavior, including academic performance, communication with others, and involvement.
4. Investigating how teacher behavior influences the psychological effect of classroom design on students.
5. Evaluate how alternative classroom design changes improve students' feelings and academic achievements.
6. Analyze how demographic characteristics and instructional styles affect students' mental health and behavior in class.
7. Emotional impact of typical classroom designs versus creative ones including technology, natural features, or interactive learning environments.
8. Explore how sociological and cultural factors, such as views regarding education, development, and sustainability, affect the psychological impact of classroom design. (Odum M., Meaney K. S., & Knudson D. V., 2021).

Comparison study based on the literature review:

Table 1: Comparison study based on the literature review. (Researcher, 2024)

Study Title	Authors	Focus and Key Findings
1. Tailoring Classroom Spaces for Intellectually Disabled Students	Jebril Tawfiq and Chen Yang (2020)	Addresses Architectural Design tailored for intellectually disabled students. Proposes key strategies for optimizing classroom environments, emphasizing a holistic approach to architectural design to promote accessibility and engagement.
2. Enhancing AEC Industry Processes with PIDO	Flager, Welle, Haymaker, et al. (2009)	Investigates PIDO to improve AEC industry processes. Identifies challenges and proposes solutions for managing complexities in AEC design cycles. Emphasizes the importance of PIDO methodologies in driving innovation and efficiency in AEC design practices.
3. Advancements in Smart Classroom Technologies for Distance Education	Davar Pishva and G.G.D. Nishantha (2008)	Examines technologies employed in smart classrooms for distance education. Addresses challenges in smart classroom systems and proposes solutions to optimize remote lecturing environments. Contributes to the discourse on smart classroom technologies and their role in facilitating distance education.
4. Enhancing Indoor Air Quality in College Classrooms	Yu Yanzhe et al. (2022)	The study explores IAQ improvement strategies, emphasizing architectural elements and ventilation practices. It highlights factors like floor level, room orientation, and window height in optimizing IAQ. Interdisciplinary collaboration is advocated for effective IAQ management.
5. Exploring Universal Design for Learning (UDL) Principles	Anna Courtad Carrie (2019)	Investigates UDL principles, particularly representation, for inclusive learning environments. Discusses benefits for students with disabilities and integration of technology. Emphasizes the importance of integrating UDL principles into educational practices for equity and accessibility.
6. Optimizing Smart Classroom Design	M. Alfoudari Aisha et al. (2021)	Focuses on smart classroom design and socio-technological integration. Proposes solutions for challenges and suggests avenues for future research. Calls for collaboration between

Study Title	Authors	Focus and Key Findings
7. Advancing Digital Design Instruction in Architectural Studios	John Marx (2000)	educators, technologists, and policymakers to create inclusive learning environments. Emphasizes the role of the design studio in architectural education and the integration of theory, critical analysis, and digital design processes. Addresses challenges in teaching digital design and proposes strategies to enhance instruction effectiveness.
8. Enhancing Architectural Education through Digital Studio Usage	Ismail, Mahmud, and Hassan (2012)	Explores the impact of digital studio tools on architectural education. Suggests integrating digital design methodologies into educational frameworks to enhance students' design capabilities and professional readiness. Provides insights into the evolution of architectural education.
9. Importance of Ergonomic Furniture Design	Al-Hinai, Al Kindi, and Shamsuzzoha (2018)	Stresses the significance of ergonomic furniture design in educational settings for student comfort and usability. Advocates for a user-centric approach to furniture design and highlights the iterative nature of design improvements based on student feedback.
Conclusion		These studies collectively underscore the interdisciplinary nature of advancements in educational environments. They emphasize the importance of integrating technology, architectural design, and pedagogical principles to create inclusive, engaging, and efficient learning environments for diverse student populations.

Through the integration of the results from these studies of the literature, our study seeks to accomplish the following goals: to establish an ideal learning environment that raises student motivation, participation, and academic performance.

The following particular goals serve as a guide for creating classroom layouts:

- 1. Improve Classroom Functionality:** Determine the best combinations and layouts for seating, lighting, and acoustics to facilitate efficient teaching and learning.
- 2. Encourage Student Engagement:** Create arrangements that make students more motivated and involved by taking into account elements like furnishings, technology integration, and group work areas.
- 3. Enhance Academic Achievement:** Examine the effects of classroom design on student conduct, academic performance, and learning objectives.
- 4. Handle Diverse Learning Needs:** Create layouts that take into account different learning styles by incorporating areas for introspective thought, adjustable seating, and assistive technology.
- 5. Promote Teacher Effectiveness:** Examine how instructional strategies, classroom management, and teacher-student relationships are impacted by classroom design.

Furthermore, research focuses on examining how classroom arrangements affect the effectiveness of course delivery, with goals including:

- 1. Identify Effective Layouts:** Examine several layouts to ascertain how they affect the effectiveness of course delivery.
- 2. Recognize Student Behavior:** Analyze how design affects involvement, engagement, and academic achievement in students.
- 3. Examine Teacher Behavior:** Look into how arrangements impact interactions between teachers and students as well as instructional strategies.
- 4. Evaluate Learning Outcomes:** Analyze how the design affects student performance and the course's learning objectives.
- 5. Identify Best Practices:** Create recommendations for the best possible classroom layout that take into account the needs of the teacher, the students, and the course material.

In addition, the following goals will be pursued in order to look into the emotional effects of classroom design:

- 1. Identify Key Elements:** Recognize the emotional impact that layout, color, and lighting have on students.
- 2. Research Emotional States:** Investigate how design impacts students' emotional states, including stress and engagement levels.
- 3. Analyze the impact of design on behavior, including participation, social interaction, and academic success.**
- 4. Examine how teacher behavior influences the emotional consequences of design.**

5. **Evaluate treatments:** Determine how well-designed treatments have improved student outcomes and emotions.
 6. **Take Individual Differences into Account:** Research how design interacts with variables like age, gender, and learning styles to influence feelings and behavior.
 7. **Examine Design Strategies:** Analyze classic and modern designs to understand their emotional impact.
 8. **Evaluate Sociological Conditions:** Consider broader cultural and societal influences on the emotional response to design.
- Our work is to further the development of research-based methods for organizing classroom spaces in ways that promote students' engagement, academic success, and emotional well-being.

IV. Conclusion

Finally, this paper examines the key factors required in creating high-quality learning environments, notably in the field of design education. By combining findings from multiple studies and literature reviews, we have demonstrated the multidimensional character of classroom design and its tremendous impact on both teaching and learning outcomes.

Our research largely emphasizes the need to create environments that are conducive to academic success, student engagement, utility, and teaching efficiency. It has been determined that a number of factors, including technology integration, lighting, acoustics, seating configurations, and classroom layouts, have a significant impact on how courses are delivered and how students learn.

Moreover, our comparative study illustrates how developments in educational contexts are multidisciplinary. We highlight the need for comprehensive strategies that consider the diverse needs of students as well as educational objectives, based on concepts from research on digital design teaching, ergonomic furniture design, smart classroom technology, indoor air quality, and universal design for learning, among other topics.

In the future, our research will set specific goals to direct the development of optimal learning environments. These objectives range from raising teacher effectiveness and fulfilling different learning requirements to enhancing classroom functionality and student engagement. We also stress how important it is to comprehend how classroom design including color, lighting, and arrangement affects student's emotions.

Our research attempts to support the creation of evidence-based strategies for creating learning environments that support instructors' and students' academic success, emotional health, and active engagement. Ultimately, we want to promote inclusive, effective, and interesting educational experiences for everyone.

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