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The Influence of Classroom Environment on Undergraduate Student Learning Outcomes

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Abstract

The classroom experience is significant to the learning outcomes of undergraduate students because it affects academic performance and engagement. A positive learning environment increases motivation alongside cognitive and participation levels among undergraduates. An approach to learning that considers class design, physical conditions of the room, and pedagogical materials available affects student's attention span, information retention, and accomplishment of academic objectives. Evidence verifies that lack of order in classroom management stifles progress, while well-ordered presentation design provides stimulating learning environments that achieve profound learning. These include basic and essential features of the room such as windows, doors, furnishings, heat and lighting. It also encompasses social dimensions, such as interactions between students and teachers, interactions among students, expectations and rules of the class, and management style which are equally important to motivate undergraduates to participate and actively engage. The possibility of controlling and modifying class layouts contributes as well to ownership over space which helps in fostering belonging and control needed for intellectual growth at the undergraduate level.

Keywords: Classroom Experience, Learning Environment, Undergraduate Students, Academic Performance, Student Engagement

1- INTRODUCTION TO UNDERGRADUATE LEARNING ENVIRONMENT:

The undergraduate learning environment is an intricate scaffold of interrelated dimensions of student achievement, identity development, and sociocultural growth. The undergraduate classroom as learning environments has the potential not only to facilitate students coming from high school to academically excel, but also positively transform their engagement, self-efficacy, and overall satisfaction towards the learning process. Classrooms during undergraduate studies are meant to be more than just knowledge ingestion; they need to facilitate knowledge creation, evaluation, and synthesis, as well as group work. Numerous constituents such as room layout and furnishings, provision of modern multimedia equipment, illumination, and the

social atmosphere of the classroom influence student experience. As universities seek to meet the needs of and purposefully aid the development of responsive and critical thinking graduates, shifting focus to the surrounding aspects of the learning environment becomes important. More specifically, what elements of the environment are important for learning to take place is crucial for developing policies aimed at enhancing student retention, critical thinking, and academic success. Studies have shown and continue to do so that well-designed classrooms help students learn better and easily take part in the classroom, at a deeper and higher level(Barrett et al., 2015).

2- DEFINING THE CLASSROOM ENVIRONMENT IN HIGHER EDUCATION:-

Within post-secondary education, a classroom is understood as both the physical setting and the psychological context within which teaching and learning takes place. Tangible aspects like the classroom's layout, lighting, temperature, seating, technological equipment, and overall aesthetics constitute its physical environment. Its socio psychological aspect pertains to the climate of relationships and the emotional environment associated with teaching, inclusion, and care. The great focus of attention should enable the accommodation of hearing, seeing, or movement differentiation, as well as encourage openness and communication as active participation in processes. In today's universities, the conception of a rigid, lecture-oriented classroom is replaced by one that is more flexible, collaborative, and conducive to innovative teamwork. Moreover, it serves a wide student base that encompasses diverse cultural backgrounds alongside differing accessibility requirements. A well-designed classroom environment sustains readiness for student success, optimally with regard to academic achievement and personal growth when thoughtfully designed(Jamieson, 2003).

3- PHYSICAL VS PSYCHOLOGICAL ASPECTS OF THE CLASSROOM:-

There are two traditional interpretations of - the spatial and the psycho-emotional environment of the classroom.These two perspectives focus on different characteristics of the space. For example, the former concerns itself with the lighting, the furniture, the temperature of the room, how sounds are organized within the room, and how the space is structured. To put it simply, these features have a direct impact on how comfortable a student feels and how deeply he or she is able to concentrate. The more concentration the student is able to have, the greater the conditions are for active learning. The supportive environment decreases distraction and maximizes accessibility.

On the other hand, the psychosocial environment comprises the emotional and social aspects of the class which includes – the interactions of students with one another, the students with the teachers, general feeling of safety and inclusion, support of identity exploration in the debate, and attitude to conflicting opinions. It has been proven that psychological safety is critical to

the emergence of creativity, critical thought, and collaborative work. Studies show that learners tend to engage deeply when they perceive that they are respected, appreciated, and feel safe emotionally within the space(Fraser, 2012). Hence, thoughtful blending of the emotional and physical elements of spatial arrangements shapes an effective undergraduate teaching and learning environment.

4- ROLE OF CLASSROOM LAYOUT IN UNDERGRADUATE ENGAGEMENT:-

Classroom design greatly influences student engagement. For example, students are more likely to participate in class activities when they are positioned in the front and center of the room, which is commonly labeled as the 'participation zone.' This means they are likely to engage in active learning activities when they are seated towards the middle or front as opposed to the back. It's also clear that traditional lecture-style seating facing the front of the classroom limits collaborative interaction. On the other hand, flexible layouts that incorporate rotatable chairs, circular seating, group tables, or movable desks allow for discussions and vibrant active learning interactions among students. Students can benefit from peer teaching, and teachers are able to achieve active teaching goals during lessons. From a different experiential perspective, valuable attention must also be given to classroom accessibility, comfort, inclusiveness, interventions, sightlines, and room design to ensure every student is fully able to participate without feeling outcasted. The active learning pedagogical approach placed greater emphasis on student participation throughout higher education, requiring meticulous focus on classroom design in order to promote engagement and the creation of effective learning opportunities that enhance deeper learning and higher retrieval of information amongst undergraduates (Brooks, 2012).

5- IMPACT OF LIGHTING AND VENTILATION ON CONCENTRATION:-

Effective learning is often accompanied by good lighting and ventilation. Furthermore, poor eye-straining lighting can reduce focus while good, natural or artificial lighting enhances attention and cognitive function. Sufficiently lit classrooms reporting greater-than-average performance levels as opposed to those with artificially lit classrooms have been proven in studies. Ventilation also plays an integral role in concentration as it upholds the standard of air quality – controlling temperature, circulation of carbon-dioxide, and cognitive functions that can be impacted greatly due to insufficient focus-busting air fresheners. Lectures and activities require concentration and can be drowsy, however, with the support of the right sorts of air, attention is maintained. Students health is promoted, however, deep learning that requires absolute focus is also made possible by institutions that provide properly ventilated and artificially-lit classrooms. One crucial step in optimizing outcomes from the

undergraduate education level is tackling the environment pollution of air and light – understanding their air-mendatory potential (Bakó-Biró et al., 2012).

6- CLASSROOM SIZE AND STUDENT PARTICIPATION:-

The proportion of space and number of students in a classroom influences participation activities scope. Students usually interact with their classmates more actively in smaller classes and receive more attention from instructors through feedback and discussion. The relationships between faculty and students deepen with increased academic success when students tend to take smaller classes. Advanced techniques of course control and room arrangements may alleviate some of the participation problems related to larger classes. Utilization of breakaway sessions, audience response techniques (clickers), and active participant seating which allows for greater interaction in larger rooms enhances class participation. Adjusting class size with these methods ensures every student the chance to succeed (Cuseo, 2007).

7- TECHNOLOGY INTEGRATION IN MODERN CLASSROOMS:-

The use of technology has revolutionized the old-fashioned undergraduate classroom into a dynamic and more interactive learning space. Technologies like smartboards, projectors, laptops, tablets, learning management systems (e.g., Moodle, Blackboard), and educational apps provide educators with multiple ways of diversifying teaching approaches and engaging students. Technology facilitates multimedia learning, encourages group projects using digital media, and provides instant feedback possibilities. In addition, technology use enables student-centered learning in the form of adaptive quizzes or video lectures. Yet, successful incorporation necessitates careful planning; ineffective integration can instead prove to be a distraction. Institutions need to ensure that faculty and students are adequately trained to use technological aids efficiently in order to achieve maximum benefits. In short, deliberate integration of technology not only enhances the learning experience in the classroom but also readies undergraduates for the digital realities of the global workforce (Kay et al., 2017).

8- INFLUENCE OF NOISE LEVELS ON UNDERGRADUATE FOCUS:-

Classroom noise levels have a profound effect on undergraduate students' capacity to focus, learn, and engage optimally. High background noise, whether internal in the form of disruption or external in the form of traffic, may lower the attention span, raise stress levels, and affect cognitive functioning. Research indicates that students who are subjected to intermittent noise disturbances perform lower than those in environments with lower noise levels. Acoustical design—i.e., sound-absorbing materials, carefully planned seating, and adequate insulation—also helps significantly in reducing noise levels. In addition, classroom management techniques that set up expectations for respectful communication also help ensure an environment conducive to

concentration. In specialized areas such as language labs or science classrooms, noise control is even more important because of the intricacy of the work being conducted. Thus, ensuring low, sustainable noise levels is crucial to maximizing students' cognitive acuity, learning effectiveness, and overall classroom experience (Shield & Dockrell, 2008).

9- STUDENTS PERCEPTIONS OF COMFORTABLE LEARNING SPACES:-

Students' perceptions of comfort in a classroom strongly affect their participation, satisfaction, and academic performance. Comfort is influenced by different physical factors such as temperature, seating ergonomics, lighting, acoustics, and spatial organization, as well as emotional factors like a warm atmosphere and sense of belonging. Studies indicate that students are more inclined to engage, take intellectual risks, and do critical thinking when they are physically comfortable and psychologically safe. Surveys and focus groups at universities point out that students appreciate flexible seating, natural light, adequate ventilation, and aesthetically appealing spaces. Significantly, comfort perceptions are subjective and can differ according to personal preferences, health status, and cultural context. Therefore, developing learning spaces that are responsive and attuned to a range of needs is critical in the development of a universally comfortable setting supportive of undergraduate learning achievement (Byers, Imms, & Hartnell-Young, 2018).

10- FURNITURE ARRANGEMENT AND LEARNING FLEXIBILITY:-

Furniture planning is a key component in designing adaptive learning spaces that support multiple approaches to teaching and learning. Immovable seating tends to restrict student movement and collaboration, while mobile furniture facilitates dynamic interactions, collaborative work, and hands-on learning activities. Modular desk-and-chair classrooms can be quickly reconfigured to support rapid transitions between lectures, discussions, and project-based work. Flexible arrangements not only promote active learning but also enable students to own their own learning space, promoting autonomy and engagement. Further, inclusive furniture design that factors in accessibility for students with disabilities ensures that all the learners are able to engage on an equal basis. Contemporary educational theory places high value on flexibility as a way of developing 21st-century skills such as creativity, communication, collaboration, and critical thinking. Thus, careful furniture design and layout are essential factors in maximizing undergraduate classroom spaces (Blackmore et al., 2011).

11- ROLE OF COLOR AND AESTHETIC APPEAL IN LEARNING:-

Color and aesthetic design factors in a classroom have a profound impact on undergraduate students' mood, attention, and overall learning experiences. Environmental psychology research indicates that some colors can trigger

certain emotional reactions: for example, blue and green colors tend to induce calmness and concentration, whereas bright colors such as yellow tend to trigger creativity and energy. A visually satisfying setting not only adds to the aesthetic enjoyment of students but also to their emotional well-being, making them more inclined to become involved and to participate. Further, classrooms incorporating careful decoration, student work, or theme-related designs tend to create a higher level of feeling of belongingness and pride in learners. Excessively colorful or too heavily cluttered rooms, however, can cause distraction, and this is why some balance must be achieved. Arranging the classroom environments through thoughtful color selections and aesthetic unity can thus prove to be pivotal in maintaining undergraduate cognitive interest and emotional ease (Barrett, Zhang, Moffat, & Kobbacy, 2013).

12- ACCESSIBILITY AND INCLUSIVITY IN UNIVERSITY CLASSROOMS:-
Making inclusive and accessible classroom environments is important for guaranteeing that all undergraduate students, independent of ability, background, or learning style, have the same opportunities to succeed. Physical accessibility amenities such as wheelchair ramps, adjustable desks, hearing-assistive technologies, and clear access routes are essential for students with disabilities. Equally important is creating an inclusive climate that is respectful and appreciative of diversity, including cultural, linguistic, and neurodiverse differences. Inclusive classrooms employ diverse instruction strategies—such as visual representations, hands-on learning, and adaptive assessment tools—to meet differing learning styles. In addition, universal design for learning (UDL) philosophy promotes settings that expect and provide for differences up front instead of retrofitting to accommodate them. By making accessibility and inclusivity priorities, institutions of higher education not only meet legal requirements but also show their dedication to fairness, creating a fuller, more vibrant experience for all undergraduate students (Burgstahler, 2015).

13- FACULTY-STUDENT INTERACTIONS IN CLASSROOM SETTINGS:-
Faculty-student interactions are a foundation of the undergraduate educational experience, significantly impacting students' academic involvement, motivation, and achievement. Favorable relationships between instructors and students foster trust, facilitate open communication, and support a collaborative classroom environment. When faculty are approachable, offer constructive feedback, and express interest in student growth, learners are more likely to engage actively, ask for assistance when necessary, and persevere through academic difficulties. On the other hand, authoritarian or distant teaching behaviors can induce a climate of fear or disconnection. Strong interaction strategies include addressing students by name, promoting questioning, providing individualized assistance, and providing a respectful, inclusive classroom climate. Research supports that high-quality faculty-student interactions are positively linked with greater retention, improved

learning, and higher student satisfaction. Thus, fostering strong relational connections in classroom environments is a critical element of successful undergraduate education (Komarraju, Musulkin, & Bhattacharya, 2010).

14- INFLUENCE OF PEER DYNAMIC AND GROUP WORK :-

Peer relationships and collaborative learning substantially impact the undergraduate classroom environment, influencing learning achievement, socialization, and student satisfaction. Interactive learning tasks in the form of group projects, peer response, and online forums enable students to exchange a variety of views, learn critical thinking, and enhance communication skills. Positive peer relationships promote a sense of belonging and community, which are critical for academic resilience. Yet, group dynamics may also bring problems in the form of unequal contribution, interpersonal tensions, or groupthink. Successful group work necessitates meticulous planning on the part of instructors, including clear expectations, balanced groups, and conflict-resolution procedures. Cooperative learning structures like assignment of specific tasks or rotating leadership can maximize the advantages of peer collaboration. Encouraging supportive peer relationships and education in collaborative skills ultimately enhances the learning experience and readies students for working as a team within their future workplace settings (Johnson, Johnson, & Smith, 2014).

15- CLASSROOM MANAGEMENT AND DISCIPLINE IN UNDERGRADUATE SETTINGS:-

Classroom management is essential to creating an organized and dignified setting in which undergraduate students can concentrate on learning. Established expectations for behavior, participation, and academic honesty foster a feeling of justice and consistency. Tactics like establishing ground rules on the first day of class, consistently applying policies, and rapidly but respectfully interrupting disturbances allow for order to be maintained. Instead of focusing on punitive actions, contemporary methods of classroom management turn to creating a positive classroom environment that promotes intrinsic motivation and respect. Active engagement strategies, such as group work and regular formative measures, also function as proactive methods of management by maintaining students' interest in the learning activity. Academic staff members who exercise authority while remaining accessible tend to gain more compliance and induce improved academic performance. Thus, reflective, habitual classroom management strategies are necessary to develop an environment for learning that is supportive of undergraduate success (Evertson & Weinstein, 2013).

16- EFFECTS OF CLASSROOM CLIMATE ON ACADEMIC MOTIVATION:-

The psychological "climate" of the classroom—the group perceptions of the students about what the learning situation is like—is a critical shaper of academic motivation. Positive classroom climate, with respect, encouragement, supportiveness, and constructive feedback, promotes students' intrinsic motivation and more active use of course materials. In contrast, a negative climate, whether perceived as hostility, excessive competitiveness, or hostility, can instill anxiety, disengagement, and reduction in academic effort. Critical factors that determine classroom climate are the communication style of the instructor, the level of peer interaction, and the general feeling of community. Educational psychology research has shown that positive classroom climate increases students' self-efficacy, persistence, and openness to learning challenges. Teachers can purposefully create classroom experiences that are psychologically safe and acknowledge student work efforts, which significantly increase motivation and academic performance among undergraduate students (Fraser, 2015).

17- THE RELATIONSHIP BETWEEN ENVIRONMENT AND ACADEMIC PERFORMANCE:-

The learning environment has a direct and quantifiable effect on undergraduate academic achievement. A range of environmental parameters—e.g., room temperature, lighting, noise levels, seating comfort—impact on students' capacity to focus, process information, and maintain cognitive effort. Repeated studies have established that students in well-designed classrooms attain superior grades, exhibit increased information retention, and show enhanced problem-solving capacity when compared with students in poorly designed rooms. In addition to physical conditions, the psychological climate—characterized by respect, support, and diversity—also has a powerful influence on academic success. Students who are supported and valued are more likely to excel academically. Longitudinal studies suggest that even modest gains in school conditions can reap substantial differences in student achievement (Barrett, Zhang, Moffat, & Kobbacy, 2013). Consequently, the relationship between learning environment and academic achievement is deep and well established, highlighting the importance of educational institutions making judicious investments in classroom design and management.

18- THE ROLE OF INSTITUTIONAL INFRASTRUCTURE:-

Institutional infrastructure refers to the larger physical, technological, and administrative facilities that enhance the learning environment in higher education. Proper infrastructure—such as new classroom buildings, current technology, stable internet connectivity, and accessible facilities—forms the basis for successful undergraduate education. Strong infrastructure institutions can provide varied teaching modalities, such as hybrid and technology-rich learning experiences, that meet diverse student needs. In addition, administrative support structures, such as academic advising, mental health

support, and accommodations for students with disabilities, also contribute to a total learning environment. Failure to invest in infrastructure usually leads to congested classrooms, old equipment, and minimal access to fundamental learning resources, all of which have adverse impacts on student success. Research emphasizes that institutions with robust infrastructure experience higher student satisfaction and better academic outcomes (Aljohani, 2016). Thus, institutional dedication to infrastructure maintenance and upgrading is critical to establishing sustainable, high-quality learning environments for undergraduate education that promote academic excellence and well-rounded student development.

19- COMPARATIVE STUDY:TRADITIONAL VS SMART CLASSROOMS:-
Traditional classrooms, where fixed seating, chalkboards, and minimal use of technology are the norms, are in sharp contrast to smart classrooms that include sophisticated digital equipment, adjustable furniture, and interactive learning interfaces. Studies that compare these learning environments show that smart classrooms tend to encourage increased student participation, cooperation, and critical thinking. Interactive whiteboards, real-time polls, and instant access to online resources enable students to actively engage instead of being passive consumers of information. Furthermore, adaptable layouts in smart classrooms accommodate various instructional styles, ranging from group discussion to flipped classroom. Traditional classrooms, by contrast, can restrict interaction and flexibility, which can inhibit contemporary pedagogical practices. Nonetheless, successful implementation of smart classrooms relies considerably on effective integration; when faculty are not adequately trained and instructional design is not carefully planned, technology can prove to be a hindrance instead of a benefit. Thus, although intelligent classrooms have many benefits, careful planning is crucial to fully achieve their potential for maximizing undergraduate learning outcomes (Madhavan & Ramesh, 2018).

20- STRESS AND ANXIETY IN POORLY DESIGNED LEARNING SPACES :- Inadequately designed classrooms—overcrowded, poorly lit, with poor ventilation and uncomfortable seating—are likely to be major causes of undergraduate student stress and anxiety. Physical discomfort, sensory overload, and feelings of confinement interfere with students' concentration and participation, causing them to feel frustrated and cognitively fatigued. In addition, conditions that are seen as being disorganized or chaotic are likely to increase perceptions of academic pressure and self-doubt. Psychological studies show that environmental stressors have a negative impact on memory retention, decision-making, and problem-solving skills, all of which are essential for academic achievement. Conversely, well-planned spaces that focus on student well-being reduce anxiety levels, enhance resilience, and promote a more positive learning attitude. Correcting classroom design

weaknesses is therefore not merely an issue of appearance or comfort but an essential measure for enhancing mental health and maximizing academic achievement among undergraduate students (Barrett et al., 2015).

21- IMPORTANCE OF NATURAL LIGHT AND AIR QUALITY:-

Natural light and air quality are essential elements of a successful undergraduate learning environment. Several studies have revealed that exposure to natural daylight enhances students' mood, energy, and cognitive abilities. Classrooms with sufficient windows and regulated sunlight exposure regulate students' circadian rhythms, leading to improved sleep patterns, enhanced attentiveness, and enhanced academic performance. In the same manner, air quality significantly affects concentration and overall well-being. Poor air quality, excessive carbon dioxide, and indoor contaminants can cause headaches, lethargy, and decreased mental acuity. Clean air circulation in well-ventilated classrooms promotes healthier lungs and clearer minds, providing an environment in which students are physically and mentally able to learn. Therefore, maximizing natural lighting and air quality through classroom design is not just critical for comfort but also for promoting educational success and student well-being (Wargocki & Wyon, 2013).

22- IMPACT OF CLASSROOM DESIGN ON CRITICAL THINKING AND RETENTION:-

Undergraduate students' capacity for critical thinking and information retention is highly influenced by classroom design. Spaces that facilitate interaction, movement, and collaboration—like flexible seating and access to diverse learning tools—enhance deeper cognitive processing. Open spaces that facilitate small group discussions, problem-solving exercises, and brainstorming sessions encourage analytical thinking and active learning, rather than memorization. Studies emphasize that students in well-planned, student-focused classrooms can better integrate information, transfer concepts to novel contexts, and retain knowledge in the long term (Baker & White, 2016).Physical signals within the space, including writable surfaces, mobile furniture, and accessible technological tools, facilitate dynamic learning processes that energize critical thinking and intellectual curiosity (Kim & Lee, 2017) . As a result, the investment in classroom layouts that are centered on flexibility, interaction, and cooperation is vital in supporting critical thinking and improving academic persistence among undergraduates (Nilsen & Kucera, 2015).

23- STUDENT OWNERSHIP AND SENSE OF BELONGING IN LEARNING SPACES:-

Student ownership and sense of belonging in classroom settings are essential in developing motivation, engagement, and academic achievement. If students perceive that the learning environment is responsive to their needs, identities,

and contributions, they are more inclined to engage actively and take ownership of their learning. Simple things—such as permitting students to customize areas of the environment, engaging students in establishing classroom expectations, and welcoming group projects—can go a long way toward building feelings of ownership. An open, welcoming classroom that recognizes diversity and supports student voice yields a higher level of emotional attachment to the institution and more commitment to academic outcomes. Studies have shown that an increased feeling of belonging is associated with higher persistence rates, lower dropout rates, and better academic performance among undergraduate students. Therefore, developing learning environments that support student identity and agency is vital in the creation of supportive and empowering learning experiences (Hurtado & Carter, 1997).

24- RECOMMENDATIONS FOR OPTIMIZING UNDERGRADUATE LEARNING ENVIRONMENTS:-

Optimizing learning environments for undergraduates involves a comprehensive approach that considers both physical and psychosocial dimensions of the classroom. Institutions should first focus on flexible, student-centered classroom designs that accommodate multiple instructional approaches, such as group work, discussions, and technology-supported learning. Proper lighting, ventilation, comfortable seating, and noise control are key physical features that have direct effects on concentration and well-being. In addition to physical adaptations, emphasizing positive classroom climate through inclusive instruction, effective faculty-student relationships, and co-operative peer interactions is important. Instructional development programs need to address how instructors can develop active learning environments and work with diverse classroom requirements. Moreover, institutional policies must facilitate equal access to resources, such as technological aids and support services. Through the combination of careful design, inclusive teaching, and strong support infrastructure, universities can establish vibrant and successful undergraduate learning contexts that optimize student potential and academic outcomes (Freeman et al., 2014).

25- CONCLUSION: ENHANCING LEARNING THROUGH BETTER CLASSROOM DESIGN:-

The impact of the classroom setting on undergraduate learner academic outcomes is paramount. An intelligently planned classroom is more than a visual sensation; it enables engagement, thought, teamwork, and scholarly grit. Both material elements—lighting, airflow, flexibility of seating, space planning—and the psychosocial—classroom climate, classroom environment, professor-student interface—combine together to ascertain how effective the education process will be. Mismanaged or poorly planned environments can

impede academic achievement, raise stress levels, and lower student motivation, while carefully designed environments encourage cognitive growth, engagement, and a feeling of belonging.

To maximize learning through improved classroom design, schools need to take an inclusive, student-centered approach. Investing in flexible, technology-enabled space, emphasizing natural light and ventilation, and promoting psychological safety and student agency are fundamental strategies. In addition, faculty development in active learning strategies and inclusive practices can optimize the potential of these spaces. By connecting physical infrastructure with pedagogical objectives, universities can develop dynamic learning spaces that enable undergraduates to achieve their full academic and personal potential. Careful design, thus, is not just an addition but a requirement for promoting excellence in higher education.

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