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RESEARCH ARTICLE
Architecture

Design and Teacher Motivation Relationship in Learning Environments

Öğrenme Ortamlarında Tasarım ve Öğretmen Motivasyonu İlişkisi

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ÖZET

Geçmiş araştırmalar, sınıfların fiziksel düzenlemesinin öğrenme için önemli bir faktör olduğunu göstermektedir. Sınıflar, öğrencilere ve öğretmenlere yenilikçi öğretim etkinliklerini barındıracak ve olumlu öğrenme etkileşimlerini kolaylaştıracak bir ortam sağlayabilir. Sınıfların tasarımı ve plan biçimleri, öğretmenleri ve onların öğretim etkinliklerine ilişkin kararlarını farklı şekilde etkileyebilir. Öte yandan, öğretmenlerin sınıflardaki rolü ve tutumları ve motivasyon stratejileri aracılığıyla öğrencilerle etkileşimi, genel öğretme-öğrenme sürecinde çok önemli bir rol oynar. Bu nedenle, bu tanımlayıcı ilişkisel çalışma, öğretmenlerin mevcut sınıf düzenlemeleri, fiziksel mekana yönelik sınıf tasarım tercihleri ve öğretmenlerin motivasyon stratejileri aracılığı üzerinden ele alınan öğrenme stilleri arasındaki ilişkileri araştırmaktadır. Bu çalışma özellikle, sınıflardaki öğrenciler arasındaki etkileşimi vurgulayan ve teşvik eden işbirlikli öğrenmeye ve öğrencilerin öz-düzenlemeli öğrenenler olmaları için öğrenme deneyimleri üzerinde düşünmeye teşvik ederek öz-değerlendirmelerini geliştirmeyi amaçlayan üretken öğrenmeye odaklanmaktadır. Çalışmanın sonuçları, bu öğrenme stilleri ile öğretmenlerin sınıf düzenlemeleri (öğretmen merkezli ve öğrenci merkezli sınıflar) ve öğretmenlerin sınıf tasarım tercihleri (genişletilebilir ve L şeklindeki sınıf tasarımlarının varyasyonları) arasında anlamlı bir ilişki olduğunu göstermektedir; ve işbirlikçi ve üretken öğrenme stilleriyle istatistiksek olarak ilişkili olduğu bulunan sınıf tasarımlarının türleri hakkında kanıta dayalı bilgiler sağlar. Bu çalışmanın sonuçları, farklı öğrenme stillerinin mimarlık ve tasarımla desteklendiği daha iyi öğrenme ortamları yaratmayı amaçlayan tasarımcılara, okul yöneticilerine ve eğitimcilere fayda sağlayacak sonuçlar sunar.

Anahtar Kelimeler: Plan düzeni; okul tasarımı; çevresel psikolojisi; motivasyon stratejileri; öğrenme stilleri

ABSTRACT

Previous studies show that the physical layout of classrooms affects learning. Classrooms can create an environment that enables creative teaching and positive student-teacher interactions. The design of a classroom can impact a teacher's instructional methods, and design and plan layouts can affect teachers and their decisions about teaching activities differently. On the other hand, teachers' role in classrooms and their interaction with students through their attitudes and motivational strategies play a crucial role in the overall teaching-learning process. This descriptive correlational study examines the relationship between a teacher's current classroom setup, their desired design, and the learning styles they use, including cooperative and generative learning. This study focuses specifically on cooperative learning, which emphasizes and encourages interaction among students in classrooms, and productive learning, which aims to improve students' self-assessment by encouraging them to reflect on their learning experiences to become self-regulated learners. The study found a significant connection between these learning styles and both the teacher-centered and student-center classrooms and the expandable and L-shape designs. These findings provide evidence for creating classrooms that support different learning styles through architecture and design and can aid designers, school administrators, and educators.

Keywords: Spatial arrangement; school design; environmental psychology; motivational strategies; learning styles

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INTRODUCTION

It is clear that education plays a vital role in the development of contemporary societies. Nonetheless, various aspects such as social, political, and technological developments impact schools in different ways. Sadly, schools have not adapted to these changes and advancements and continue to primarily follow outdated educational methods and beliefs from the last century (Baker, 2012).

Educational institutions where students receive instruction are a crucial component of the education system. School buildings not only function as educational spaces, but also serve as a valuable asset to the community and play a major role in shaping the educational experience (Moore & Lackney, 1994). The extent to which the design of

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school buildings impacts education has become a key concern for policymakers, educators, and researchers in both the fields of architecture and education (Chaney & Lewis, 2007).

Over the past several decades, efforts have been made to improve the quality of schools in the US through educational reforms and initiatives such as "A Nation at Risk," "The New American Schools Development Corporation (NASDC)," and "EAI's Alliance for Schools That Work," which aimed to enhance the curriculum and outcome-based education. However, the state of school buildings and classrooms has declined and they now face overcrowding issues. There is also a widening disconnect between the education programs and the design of educational facilities, due to the absence of proper collaboration between school staff, teachers, and designers (Chubb & Moe, 1991 as cited in Lackney, 1994).

The current state of education has brought about numerous pressing concerns, such as envisioning the ideal schools and classrooms for the future and finding ways to enhance current ones. Despite the changes happening globally in terms of education, the conventional classroom arrangement where students sit in rows still persists, not aligning with diverse teaching styles or promoting teacher-student interaction. Additionally, this traditional setup promotes a one-sided learning environment where the teacher is the sole authority and students are not encouraged to learn from each other or engage in peer-to-peer teaching (Sharan, 1999).

Ideally, education should take place in a setting that enables students to actively participate in learning by engaging with the concepts taught. This fosters the idea that students should be active participants, not just passive recipients. Effective communication is also crucial in the classroom environment. Teachers play a key role in creating an atmosphere where students can exchange ideas and form the foundation for knowledge building by encouraging reflection. The teacher's behavior, attitude, and motivational techniques are crucial factors in the teaching-learning process (Turner, 2007).

LITERATURE REVIEW

In the 1950s, psychologists and behavioral scientists started to focus more on the connections between the built environment, human behavior, and experiences. The study of ecological psychology was formed and classroom design research began to examine how classrooms operate. Research indicates that the way a classroom is arranged and designed can impact the social interactions of teachers and students, play a role in achieving educational objectives, convey symbolic messages about what is expected in that space, and communicate behavior expectations. (Prohansky & Wolfe, 1975; Riwlin & Winstein, 1984; Gump, 1987).

Humans have been exploring their surroundings since ancient times, but using research as a means to design better educational facilities is a relatively recent concept. In the 1930s, early research highlighted the impact of school lighting and ventilation on educational buildings. Over time, research became more extensive and delved into various aspects of the educational environment (McGuffey, 1982). In the 1950s, behavioral scientists and psychologists started exploring the connection between physical spaces and human behavior and experience, leading to the creation of new fields known as architectural psychology, environmental psychology, and ecological psychology. This focus area originated from seminal studies conducted in the late 1950s and 1960s. (e.g., The Hidden Dimension, Function as the Basis of Psychiatric Ward Design, Image of the City, Notes on the Synthesis of Form, One Boy’s Day, and so on) (White, 1979).

The field of architecture shifted its focus to the impact of physical structures on behavior and psychology. Architects started to understand that the design and appearance of a building can affect the actions of its occupants. As a result, it has become widely acknowledged that buildings such as schools, offices, libraries, etc. impact behavior patterns. The study of environment-behavior further supports this idea, stating that behavior in a space is influenced by both the physical setting and the individual's perception of it. Thus, both the physical space and the user's awareness can alter the way the space is used and its value. (Ittelson, 1974).

Researchers from various fields may have differing perspectives on the meaning of the classroom, but they often agree that it serves as a problem-solving venue where teachers and students collaborate to enhance learning outcomes (Smeyers, 2013). The classroom setting also plays a crucial role in reflecting and shaping the educational philosophy and actively participating in the educational process (Proshansky & Wolfe, 1975).

Classrooms have a pre-existing cultural perception (David & Wright, 1975), which is deeply ingrained in society (Martin, 2002). Despite their complexity with various dimensions and variables, there is a challenge in finding definitive research results regarding the environmental factors that enhance teaching and learning in classrooms, due to various reasons. In literature, there is a disagreement regarding (Martin, 2006):

- ✓ What constitutes effective learning and its relation to hard work and concentration

- ✓ The important factors and processes in the learning environment and how they interact
- ✓ The challenge in accurately measuring learning processes and outcomes, leading to reliance on observable behaviors
- ✓ The differences in physical aspects of school environments
- ✓ The variety in students' preferences, needs and personal characteristics
- ✓ The heterogeneity among teachers, including their preferences, personal traits and teaching styles.

Previous studies (Woolner et al, 2012, 2007; Higgins et al, 2005) have shown there is no clear connection between the physical learning environment and student learning. Although it's commonly believed that the physical environment affects education (Durán-Narucki, 2008; Kumar et al, 2008), it's challenging to prove a direct correlation between better environments and improved learning. The relationship between education and physical environment is both complicated and interactive, as indicated by conflicting research findings and current school experiences (Woolner, McCarter, Wall, & Higgins, 2012; Gislason, 2010; Higgins, Hall, Wall, Woolner, & McCaughey, 2005; Saint, 1987; Weinstein, 1979).

Both the environment and users have a reciprocal influence on each other during interactions, where users have the power to improve their surroundings, impacting the learning experience. Architect Sandra Horne-Martin has studied this aspect of utilizing school environments and suggests that training and education are crucial to equip teachers to adapt their classrooms to match their teaching style (Horne-Martin 2002, 2004a, 2004b, 2006). The physical state of the building and factors at the school level, such as student behavior, attendance and academic performance, impact a teacher's ability to align their classroom with their teaching objectives. Research must investigate the relationship between the physical learning environment and the school community to determine which combinations lead to higher levels of satisfaction and improved student learning outcomes.

An aspect of learning environments that has received limited attention is the amount of available space, including both the classroom size and the capacity for students. While there has been extensive research on the effects of class size on education outcomes, researcher Lorraine Maxwell (2003) highlights that the impact of spatial density, or the amount of space per person, has received less attention. There are indications that limited space in the classroom can negatively impact student activities, attitudes, achievements, and social relationships. A crowded setting can also lead to increased noise levels and ventilation issues, which can hinder the learning process. (Woolner et al, 2007; Woolner & Hall, 2010).

Spatial Layout and Learning

The physical arrangement of the classroom, on the other hand, encompasses the seating arrangements of students, the positions of both students and teacher relative to each other, movement of people within the room, and the general feeling of atmosphere and organization. Studies on classroom surroundings suggest that classrooms should be designed to support a range of activities during the day and align with the teacher's teaching objectives (Weinstein, 1992; Savage, 1999). Furthermore, the classroom should be configured to enable teachers to address students' academic, social, and emotional needs. (MacAulay, 1990).

The criteria for selecting the best spatial layout to achieve these goals involve maximizing the teacher's visibility to and from students, ensuring ease of movement in the classroom, reducing distractions to promote active learning, and giving each student and teacher their own personal space while ensuring everyone can see classroom displays. Arranging the physical classroom can enhance the learning environment and prevent negative behaviors. Research has demonstrated that the physical arrangement can impact both student and teacher behavior, and a well-organized classroom typically leads to improved academic and behavioral outcomes for students (Savage, 1999; Stewart & Evans, 1997; Weinstein, 1992), and that a well-structured classroom tends to improve student academic and behavioral outcomes (MacAulay, 1990; Walker, Colvin, & Ramsey, 1995; Walker & Walker, 1991). Furthermore, the atmosphere in the classroom represents to students and others what the teacher considers important in regards to conduct and education (Savage, 1999; Weinstein, 1992).

Teachers have various duties and perform various functions in the classroom, such as controlling the learning environment, delivering effective instruction, and impacting student outcomes. Research shows a correlation between a teacher's effectiveness and student achievement, with lower-performing students benefiting first when teacher effectiveness improves (Sanders & Rivers 1996; Marzano, Marzano, & Pickering, 2003). Additionally, teachers become more effective when the physical characteristics of the classroom meet their needs and expectations (Martin, 2002). Historian Malcolm Seabourne (cited in Grosvenor, Lawn, and Rousmaniere, 1999) states that school buildings influence teaching methods.

Teachers play a crucial role in shaping the classroom environment by accommodating and adapting to it. They must create an environment that stimulates students and adjust the stimulation based on their behavior. The teacher must also use this information to align with educational goals and ensure it leads to positive student outcomes (Adams & Hiddle, 1970). Classrooms can therefore be seen as environments designed by the teacher. Understanding the teacher's attitudes and motivations towards the physical arrangement of the classroom is crucial, as they have a significant impact on the learning environment. The physical arrangement of the classroom by the teacher sets the stage for learning and actively participates in the teaching and learning process (Martin, 2006; Loughlin & Suina, 1982).

In conclusion, to effectively address diverse teaching needs, it's crucial to recognize the various learning styles. The physical aspect of the classroom should match the teacher's educational beliefs and preferences while promoting collective learning. The teacher's teaching methods, motivational strategies, evaluation methods and the physical environment are impacted by their values, beliefs, and attitudes.

METHODOLOGY

The theoretical constructs of this study are based on the field of ecological psychology and the framework consists of the two theories from ecological psychology: theory of behavior settings and the theory of affordances. In most general terms, ecological psychology is the description of a concept that focuses on the relationships between human behavior and the constructed or natural environment. In Roger Barker's ecological psychology - later called as eco-behavioral science by him - Barker and his colleagues invented an experimental observation method to observe and note children's activities and behavior patterns during their daily lives. Instead of examining the environment performing at individual level, Barker's approach was based on finding higher-order structures that arise through the actions of two or more individuals in mutual environment - with environmental objects and other features as well. This whole surrounding/environment was called milieu, and the active structures that generated shared and coordinated actions by individuals were called behavior settings (Heft, 2011). Barker (1978) argues that, a behavior setting is place where native people can find individual motives which gives them satisfaction. In other words, a behavior setting is composed of opportunities for people. However, in the same setting, people can obtain satisfaction differently. Thus, the theory of behavior settings implies that the environment imposes responsibilities on its inhabitants. Its significance lies in its potential to help understand the connection between behavior and surroundings, which are interconnected yet conceptually distinct. The theory of affordances states that these are features of the environment that exist objectively and have psychological significance. They result from the interaction between the environment and the perceiver and form meaning in the shared experiences of individuals and their surroundings (Heft, 2010; 2011).

Based on the ontological assumptions of the theory of behavior settings, we can collect information about the pattern or higher order structure of teacher behaviors that occur in classroom environments. Although the theory of behavior settings has been widely used through conducting direct observations in real world settings, this study proposes the collection of behavioral data through self-reports in order to reach a large number of sampling and information from different school settings. On the other hand, the concept of the theory of affordances is a useful way for understanding and explaining the essential qualities of environment psychologically. Therefore, to be able to create multi-functional classrooms, as well as increase the amount and type of affordances, it is important to understand whether or not the availability of classroom affordances (classroom environment attributes) differs in classroom settings where teacher attitudes are different than each other. According to the theory of behavior settings, information can be gathered on the patterns or higher-level structures of teacher behaviors in classroom environments through ontological assumptions. While direct observations in real-world settings have been a popular method of using this theory, this study suggests collecting data through self-reports to reach a larger sample and information from various schools. Meanwhile, the theory of affordances provides a useful perspective for comprehending and explaining the psychological features of the environment. To design multi-functional classrooms and enhance the variety and quantity of affordances, it is crucial to determine if the presence of classroom affordances (environmental attributes) varies in classrooms where teachers have different attitudes.

Research Design

Research on educational facilities has shown that the physical characteristics of schools and classrooms can affect both the behavior and educational outcomes of students and teachers. There is a need for further exploration of the relationship between these physical aspects and the behavior of users. However, the complex nature of classroom environments, with many different dimensions and variables, makes it difficult to draw clear conclusions about what environmental factors promote effective teaching and learning. One understudied aspect is the impact of

teachers' attitudes, personal characteristics, and teaching styles on the teaching-learning process, which has been shown to be crucial in the literature.

This study aims to explore the connection between the classroom environment and the motivational strategies employed by teachers. Classrooms are viewed as environments created by teachers and teachers are considered to be the decision-makers who shape these environments based on their attitudes and preferences. The study raises the following questions:

- ✓ What is the link between the classroom environment and teacher motivation?

To answer this, the following sub-questions are posed:

- ✓ Does the current arrangement of the classroom have any impact on the motivational strategies used by the teacher?
- ✓ Is there a relationship between the teacher's preferred classroom design and their motivational strategies in the classroom?

The study employed a descriptive correlational research design to examine the connections among the variables under consideration. This approach was selected as it allows for an understanding of the relationships between various real-world variables (such as physical features of classrooms and characteristics of teachers) that may impact the dynamics of social-physical interaction. The teachers were the unit of analysis for the study. The statistical analysis was performed with a significance level of .05, and the results were based on survey data. The study used various data analysis techniques including descriptive analysis, exploratory factor analysis, and chi-square tests as a method of correlational analysis. The internal consistency of the scales was determined using Cronbach's alpha, with the exception of single-item measures for which internal consistency cannot be computed.

Participants

The study was conducted in Wake County, North Carolina, USA and teachers were selected as participants to gather a wide range of data exploring their attitudes and motivations in regards to classroom space design. All 234 middle school teachers involved in the study resided in Wake County, North Carolina. The sample consisted of two main groups: 196 active teachers from 8 different middle schools within the Wake County Public School System, and 80 middle school teachers pursuing doctoral studies at North Carolina State University's College of Education.

Description of Variables

This study focuses on using teachers' current classroom set up as a measure of their physical surroundings. A comprehensive analysis of available literature led to the identification of six common classroom arrangements that are representative of typical classrooms. These arrangements were then created using AutoCAD software (see Figure 1).

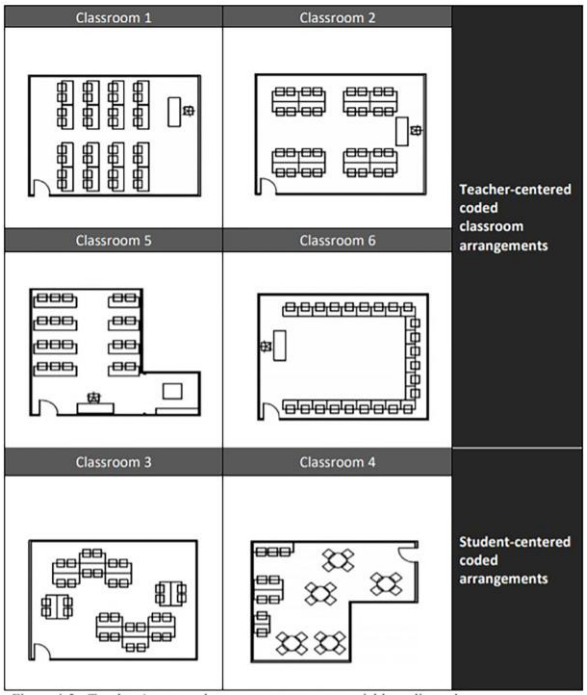


Figure 1: Images used to represent teachers' current classroom arrangements **Source:** Produced by the author.

This study aimed to examine teachers' preferred classroom arrangements by asking them to select the arrangement they most frequently use in their classroom. The classrooms were then classified as teacher-centered or student-centered based on their characteristics and findings from previous research. The study also aimed to investigate teachers' preferences in classroom design, as the research views teachers as experts and classrooms as environments designed by teachers. To achieve this, a comprehensive review of relevant literature was conducted to identify innovative classroom designs as identified in previous studies in the field of design and education. The study used variations of L-shaped and expandable classrooms to understand teachers' preferences in classroom design. This study focused on L-shaped and expandable classrooms because they were considered the most distinctive and innovative classroom layouts in the field of classroom design literature, and were also able to accommodate a wider range of activities. The aim of this aspect of the study was to introduce teachers to innovative classroom designs that deviate from traditional classroom shapes and to broaden the knowledge on the relationship between classroom layout and teacher behavior and attitudes, as well as to uncover teachers' preferences.

To address this aspect of the study, six innovative classroom layouts were generated using 2D and 3D architectural softwares. The teachers were presented with six classrooms, each pair of which had equal class size, similar furniture and table arrangements, similar color schemes, and similar access to the outdoors. These classrooms were categorized as expandable and variations of the L-shape design. (see Figure 2).

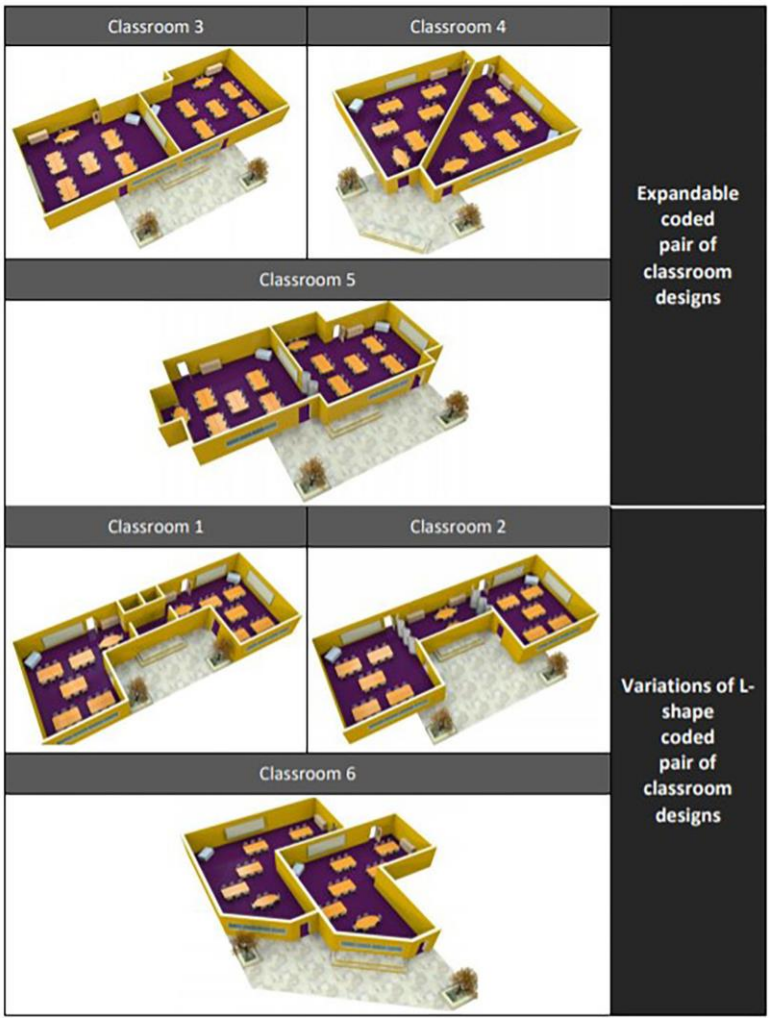


Figure 2: Teachers' classroom design preferences variable coding scheme
Source: Produced by the author.

Motivational strategies refer to methods used by teachers to stimulate and increase student motivation during instruction (Guilloteaux & Dörnyei, 2008). These strategies play a crucial role in shaping the teaching and learning experience. Literature suggests that the motivational strategies employed by teachers can have a significant impact on students' motivation towards learning (Fives & Manning, 2005; Cheng & Dörnyei, 2007; He, 2009). To study these strategies, a list of 102 items called the "Motivational Teaching Practice (MTP)" developed by Dörnyei (2001) was used as a starting point. From this list, seven items were selected that were deemed most relevant to middle school and aligned with the goals of the study. Teachers were asked to rate their agreement with each

statement on a 5-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = most of the time, and 5 = always). The aim of this aspect of the study was to investigate the use of motivational strategies by teachers and to examine the relationship between these strategies and the physical environment. The following statements were used in the survey:

- ✓ Item 1: I set class rules myself rather than allowing my students to do so
- ✓ Item 2: I encourage my students to give suggestions for improving the course 125
- ✓ Item 3: I give immediate feedback to my students
- ✓ Item 4: I start all my lessons with the same presentation technique
- ✓ Item 5: I use tasks that allow my students to interact with each other
- ✓ Item 6: I teach my students self-learning strategies
- ✓ Item 7: I encourage my students to learn from each other

The items 5, 6, and 7 are motivational techniques that are linked to particular learning methods. Item 5 involves giving students tasks that require interaction with each other, while item 7 involves encouraging students to learn from one another, both of which fall under the umbrella of cooperative learning. This approach emphasizes and fosters interaction between students in the classroom and provides opportunities for speaking, listening, and communicating within an educational setting (Pilegard & Fiorella, 2016). The significance of cooperative learning, also known as group work, in classrooms is that it enables teachers to address both social and intellectual learning goals while also enhancing students' academic skills through collaboration on tasks that they may not be able to complete on their own (Coates & Mayfield, 2009). Item 6, encouraging students to learn from each other, is a motivational strategy related to generative learning, which aims to improve self-assessment by having students reflect on their learning experiences and become self-directed learners (Pilegard & Fiorella, 2016).

FINDINGS

To examine the relationship between teachers' current classroom setup and their motivational strategies, a chi-square test of likelihood was conducted. Table 1 summarizes the outcome of the test:

Table 1: Likelihood Chi-Square test for motivational strategies and teachers' current classroom arrangement

Statements	Value	df	Asymp. Sig. (2-sided)
Item 1	5.262	4	.261
Item 2	2.928	4	.570
Item 3	6.506	3	.089
Item 4	.982	4	.913
Item 5	7.913	3	**.048**
Item 6	6.320	4	.176
Item 7	7.986	3	**.046**
N of Valid Cases	234		

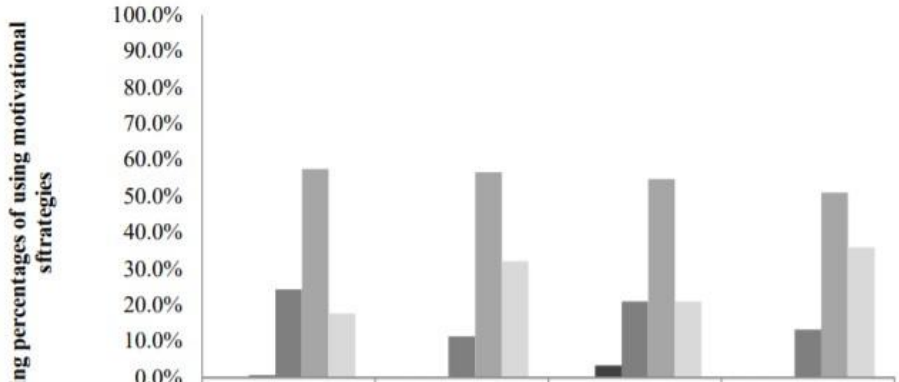
Table 1 shows that the tests between the two variables, teachers' current classroom arrangement and their motivational strategies, were found to be statistically significant at a level of 0.05 for the following motivational strategies/items:

- ✓ Item 5: I use tasks that allow my students to interact with each other, X 2 (3, N=234) = 7.91, p = .048, with a moderate (Cramer's ϕ = .18) effect size.
- ✓ Item 7: I encourage my students to learn from each other, X 2 (3, N=234) = 7.98, p = .046, with a moderate (Cramer's ϕ = .17) effect size.

Both of these motivational techniques are tied to cooperative learning by promoting interaction among students in the classroom. The goal of this strategy is to create opportunities for speaking, listening, and communicating within an instructional context (Pilegard & Fiorella, 2016). The significance of cooperative learning (or group work) in the classroom is that it enables teachers to meet both intellectual and social learning goals and enhances students' academic abilities by having them work together on tasks that would be challenging for them to complete alone (Coates & Mayfield, 2009). Figure 3 shows the difference in the rating percentages of statements related to motivational strategies for both teacher-centered and student-centered classroom arrangements and the following results were found:

- ✓ Item 5 - I use tasks that allow my students to interact with each other: The percentage of teachers who frequently use this motivational strategy (most of the time or always) was found to be 14% higher among those who teach in student-centered classrooms compared to those in teacher-centered classrooms.

✓ Item 7 - I encourage my students to learn from each other: The percentage of teachers who frequently employ this motivational strategy (most of the time or always) was found to be 11% higher among those who teach in student-centered classrooms compared to those in teacher-centered classrooms.



	Teacher-centered	Student-centered	Teacher-centered	Student-centered
	I use tasks that allow my students to interact with each other		I encourage my students to learn from each other	
Never	0.0%	0.0%	0.0%	0.0%
Rarely	.6%	0.0%	3.3%	0.0%
Sometimes	24.3%	11.3%	21.0%	13.2%
Most of the Time	57.5%	56.6%	54.7%	50.9%
Always	17.7%	32.1%	21.0%	35.8%

Figure 3: Percentages of motivational strategies' ratings in relation to current classroom arrangements

Secondly, a chi-square test of likelihood ratio was carried out to explore the relationship between teachers' preferred classroom design and their motivational strategies. Table 2 summarizes the results of the tests.

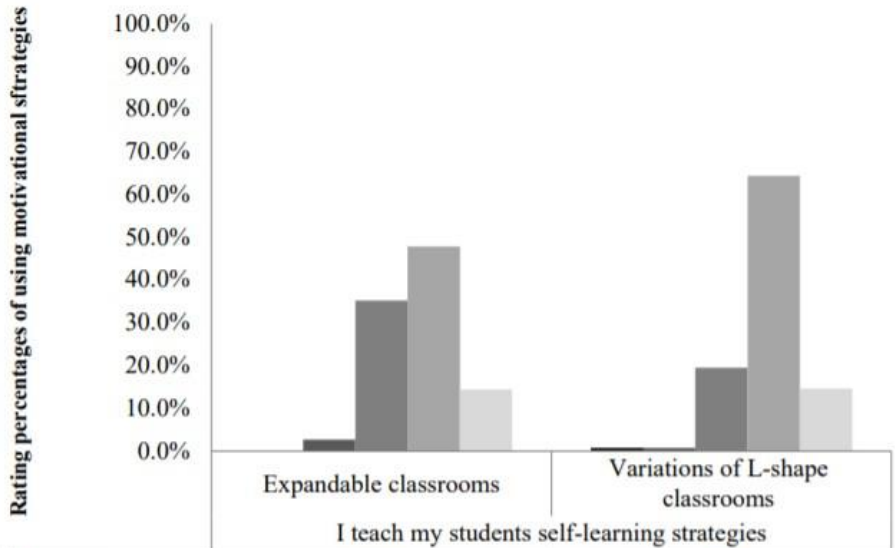
Table 2: Likelihood Chi-Square test for motivational strategies and classroom design preferences (overall)

Statements	Value	df	Asymp. Sig. (2-sided)
Item 1	1.727	4	.786
Item 2	4.384	4	.357
Item 3	6.153	3	.104
Item 4	1.142	4	.888
Item 5	2.256	3	.521
Item 6	10.696	4	**.030**
Item 7	4.896	3	.180
N of Valid Cases	234		

Table 2 shows that the tests between the two variables, teachers' preferred classroom design and their motivational strategies, were found to be statistically significant at a level of 0.05 for the following motivational strategy/item:

✓ Item 6: I teach my students self-learning strategies, X 2 (4, N=234) = 10.69, p = .030, with a moderate (Cramer's ϕ = .28) effect size.

This motivational technique is linked to generative learning, which aims to improve students' self-assessment by encouraging reflection on their learning experiences, making them self-directed learners (Pilegard & Fiorella, 2016). As shown by Figure 4, the percentage of teachers who frequently use this motivational strategy (most of the time or always) was found to be 17% higher among those who prefer variations of L-shape classrooms compared to those who prefer expandable classrooms.



	Expandable classrooms	Variations of L-shape classrooms
Never	0.0%	.8%
Rarely	2.7%	.8%
Sometimes	35.1%	19.5%
Most of the Time	47.7%	64.2%
Always	14.4%	14.6%

Figure 4: Rating percentages of motivational strategy for generative learning in relation to teachers' classroom design preferences

CONCLUSIONS

The results of an investigation into the connection between teachers' motivational tactics and the classroom setting showed that strategies related to cooperative learning were more frequently used in student-centered classrooms. This was expected as cooperative learning emphasizes interaction and engagement between students and teachers, and student-centered classrooms often have physical arrangements that promote group work. Previous research (Martin, 2002; Moores & Moores, 2007) supports the idea that student-centered classrooms facilitate interaction.

The relationship between teachers' motivational strategies and their preferred classroom design was also examined, and it was found that a motivational strategy aimed at promoting generative learning was linked to specific classroom design preferences. Teachers who use this strategy, which focuses on enhancing students' self-assessment by encouraging reflection on their learning experiences, were found to prefer L-shaped classroom designs over expandable designs. Thus, the choice of classroom arrangement and layout can depend on the type of learning that teachers want to promote.

In conclusion, classrooms should be adaptable to accommodate traditional instruction methods, as well as small groups, individual work, multipurpose activities, and teaching/learning styles. This study highlights the impact of classroom design and architecture on teaching practices and learning outcomes, as the physical characteristics of the classroom environment were found to affect teacher and student behavior, attitudes, and practices. Despite the potential benefits, there have been few studies that examine classroom design from a teacher's perspective, with the majority of research focusing on the relationship between the physical environment and students' academic and behavioral outcomes. The findings and design recommendations of this study provide some potential options for classroom design and arrangement, depending on the specific needs and circumstances. The results and recommendations suggest that there is no single classroom design or arrangement that can accommodate all types of teaching methods, subjects, learning styles, etc. Nevertheless, it is crucial to design classrooms as specialized learning spaces that cater to the needs and preferences of teachers, as this can maximize the potential of the physical environment to enhance both educational and behavioral outcomes. In summary, the physical characteristics of a classroom environment have been shown to impact teacher and student behavior, attitudes, and practices, leading to improved learning outcomes. As a result, classroom design and architecture have the potential to greatly support teaching practices.

REFERENCES

Baker, L. (2012). A History of School Design and Its Indoor Environmental Standards, 1900 to Today (Non Journal Reports - Descriptive No. ED539480). National Clearinghouse for Educational Facilities.

Chaney, B., and Lewis, L. (2007). Public School Principals Report on Their School Facilities: Fall 2005

Groat, L. N., & Wang, D. (2002). Architectural research methods. New York: J. Wiley.

Heft, H. (2010). Ch.1: Affordances and the Perception of Landscape: An Inquiry into Environmental Perception and Aesthetic (pp.9-32). From the Innovative Approaches to Researching Landscape and Health : Open Space: People Space 2. New York: Routledge.

Horne-Martin, S. C. (2002). The classroom environment and its effects on the practice of teachers. Journal of Environmental Psychology, 22, 139–156.

Ittelson, W., Rivlin, L., et al.(1974). An Introduction to Environmental Psychology.New York: Holt, Rinehart and Winston.

Lackney, J.(1994). Educational Facilities: The Impact and Role of the Physical Environment of the School on Teaching, Learning and Educational Outcomes, Publications in Architecture and Urban Planning F University of Wisconsin-Milwalkee, Milwalkee, WI.

Loughlin, C.E.& Suina, J.H.(1982). The Learning Environment: an Instructional Strategy.New York: Teachers College Press

Martin, S. H. (2002). The Classroom Environment and Its Effects on the Practice of Teachers. Journal of Environmental Psychology, 22(1–2), 139–156. http://doi.org/10.1006/jevp.2001.0239

Martin, S. (2004a). Environment-Behaviour Studies in the Classroom. The Journal of Design and Technology Education, 9(2), 77–89.

Martin, S. D. (2004b). Finding balance: Impact of classroom management conceptions on developing teacher practice. Teaching and Teacher Education, 20, 405-422.

Martin, S. H. (2006). Children and their environments: learning, using, and designing spaces. Cambridge, UK ; New York: Cambridge University Press McCann, E. and Turner, J. (2004). Increasing student learning through volitional control. Teachers College Record, 106(9), 1695-1714.

McGuffey, G. W. (1982). Facilities. In Improving educational standards and productivity: the research basis for policy. Berkeley, Calif.

Moore, G. T., & Lackney, J. A. (1994). Educational facilities for the twenty-first century: research analysis and design patterns. Milwaukee, WI: Center for Architecture and Urban Planning Research, University of Wisconsin-Milwaukee.

Sharan, S. (1999). The innovative school: organization and instruction. Westport, Conn: Bergin & Garvey. Linking Architecture and Education: Sustainable Design of Learning Environments

Proshansky, E., & Wolfe, M. (1974). The Physical Setting and Open Education. The School Review, 82(4), 557–574. https://doi.org/10.1086/443150

Weinstein, C. S. (1979). The physical environment of the school: A review of the research. Review of Educational Research, 49(4), 577–610

White, W. P. (Ed.). (1979). Resources in environment and behavior. Washington: American Psychological Association.

Woolner, P., McCarter, S., Wall, K., & Higgins, S. (2012). Changed learning through changed space: When can a participatory approach to the learning environment challenge preconceptions and alter practice?

Improving Schools, 15(1), 45–60. http://doi.org/10.1177/1365480211434796

Woolner, P. (Ed.). (2015). School Design Together. London ; New York, NY: Routledge.